

Read Report of Western Warm Air Meeting This Issue

American Artisan Record

and Hardware

Sheet Metal Work-Warm Air Heating

Vol. 94, No. 24

CHICAGO, DECEMBER 10, 1927

\$2.00 Per Year

EXPERIENCED FURNACE MEN
INSIST ON IT

LIVE JOBBERS EVERYWHERE
STOCK IT

STANDARD FOR
65 YEARS

NO WASTE IN
THE PACKAGE

IS ODORLESS

MAKES FURNACE
JOINTS
GASTIGHT

DOES NOT
SHRINK OR
CRACK

EASY TO USE



*Write Us for Sample and Prices
Before You Decide On Your Source of Supply for 1928*



PECORA PAINT COMPANY

Established 1862
by Smith Bowen

4th and Erie Avenue
PHILADELPHIA, PENNA.

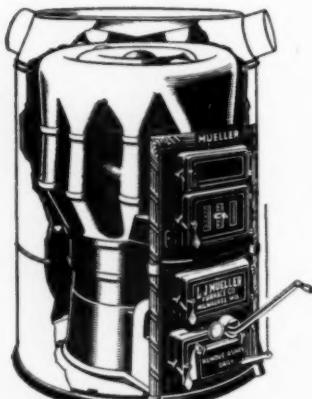
Incorporated
1911

A message to DISCONTENTED FURNACE DEALERS!

DISSATISFIED? Down at the mouth? Disgusted with things as they are? Good!—because the furnace dealer who is healthily discontented is simply filled with a desire—for a more profitable business. All leaders became leaders because they were dissatisfied with any lesser position.

Mueller offers progressive, discontented furnace dealers an unusual opportunity to win local leadership in the heating business.

Mueller offers you a complete line of high quality heaters—a type and size for every kind of heating job, and for every kind of buyer. You can meet price competition with the Mueller return-flue full-front furnace—heavier, sturdier, and a more efficient heater than similar types, yet no higher priced.



Mueller Double Radiator Furnace—A self-cleaning furnace with more direct heating surface than any other furnace of equal grate area. Actually "tons of coal cheaper" in operation.

Mueller offers in addition, a complete program of resale co-operation that includes advertising and merchandising helps that find prospects, develop sales. This service includes, also, the preparation of plans and material estimates, assistance in closing deals—and even financing help.

Write us for complete details. Cash in on your discontent!

L. J. MUELLER FURNACE COMPANY
ESTABLISHED 1857

193 Reed Street, Milwaukee, Wis.

Makers of coal and gas-fired Heaters for Warm Air, Steam, Vapor and Hot Water, Cabinet Heaters, Combination Tank Heaters and Garbage Burners, Registers, Furnace Pipe and Fittings.

Showrooms and Warehouses:

Boston	Chicago	Minneapolis	St. Louis
Baltimore	Detroit	St. Paul	Seattle
Fort Collins, Colo.			Salt Lake City



Gas-Era Warm Air Furnace—especially designed for burning manufactured or natural gas. Equipped with Perfection Air Moistener. Automatic, tamper-proof operation; cast iron sectional construction; simple installation.



Mueller Full-Front Return Flue Furnace—Projecting ash pit and feed section with slipover shields set in place without bolts. Upright shaker handle with triangular grates. A high-quality, low-priced furnace.

MUELLER FURNACES

easier to sell than to sell against

The 34th Warm Air Furnace Annual

NEVER before have advertisers taken such advantage of their opportunity to make a smashing display as they have this year in our 34th Warm Air Furnace annual.

More double page spreads are set in type NOW than we had in our last year's big annual.

Interest in the Warm Air Heating Industry is not only *keen* but *highly important* and *no other medium* is equal to this for your important message.

This Annual will tell what the "other fellow" thinks about the future of the warm air heating business—it will tell

what the "other fellow" did in 1927—and how he did it.

The value of this Annual to the warm air heating and sheet metal trade is well known to the industry and many manufacturers of Warm Air Furnaces, Sheet Metals and Warm Air Heating Supplies have contracted for their advertising space in this issue.

The 34th Warm Air Furnace Annual will be issued on December 31st. This means that you should make your space reservations and send your copy at once.

Numerous requests for the Front Cover position have been received but the Front Cover is NOT FOR SALE.

Following our usual example an art cover symbolic of the warm air heating industry will be used. A proof in colors of this cover is available now—we will send you one on request.

AMERICAN ARTISAN 620 So. Michigan Ave., Chicago, Ill.



?

How much can you heat with a 22 in. pot?

When the ratio of the heating surface to the grate area in a furnace is greater than 20 to 1; you can get 2% more in heating capacity for each degree (in ratio) above 20.

The ratio of our No. 454, Front Rank with 22-inch fire pot, is 34.3. Applying the rule just quoted we have:

Front Rank
No. 454 has
29% greater
heating capacity
than average 22 in. pot

$ \begin{array}{r} 34.3 \\ 20.0 \\ \hline 14.3 \\ \times 2\% \\ \hline 28.6\% \end{array} $

A 29% greater heating capacity using the same amount of coal and having the same size fire pot! The greater satisfaction that your customer will get out of this extra capacity will prompt him to recommend you to others. Front Rank Warm Air Heating Systems are always the basis of a sound, profitable business for the installer. Write for our proposition.

LANGENBERG MFG. CO.
4545 N. Euclid Ave. St. Louis

FRONT RANK TRADE NAME REGISTERED HEATING SYSTEMS

Guarantee—

Every Front Rank Warm Air Heating System is guaranteed by the Langenberg Manufacturing Company (to maintain an average inside temperature of 70° in zero weather) when installed according to the Standard Code.

WELL MADE WELL ADVERTISED
WELL KNOWN

L.228

WISE The Better Furnaces

New
WISE
Improve-
ments



WISE OPEN DOME
CAST FURNACE

THE New Wise Open Dome is improved with the Wise Cellular Firepot.

It is One-Piece and heavily constructed.

It has a series of air cells which extend from bottom to top which enable the air to become pre-heated before entering above and into the fuel. This supplies a continuous and evenly distributed air blast.

Another feature is the Elbow Shaped Flue Collar on Inside of Radiator which is turned up so all of the heat must follow the castings to the top before entering flue.



WISE 20 SERIES CAST
FURNACE

New
WISE
Ideas

THE Famous Wise 20 Series has added still more fame for itself since this new Patented radiator appeared.

The feed chamber and the top radiator are so constructed as to allow communication between them which brings the opening of the fire flues of the radiator directly into the feed chamber, making the flues readily accessible for cleaning through the upper feed door. The dirt falls directly into the fire-pot, eliminating the necessity of taking the soot out by means of a narrow neck passage. This is a big advantage to the owner as a radiator that is easy to keep clean will be kept clean. And this means increased heating efficiency. This improved Wise Furnace has a New Cellular Fire Pot that provides complete combustion.

a
New Steel
Furnace



WISE STEEL FURNACE

To enable you to confine your quality furnace business to one house the Wise Steel Furnace was created. Notice that the Wise Steel Furnace is a better steel furnace having features that make it last longer where others have weak spots.

The bottom of the radiator on the Wise Steel Furnace has a Cast Iron Soot Box and Clean Out.

This you know is the big weak spot in other steel furnaces. The Wise Steel Furnace like all Wise furnaces is Guaranteed high quality. It possesses all the latest scientific heating features and all modern conveniences. It is riveted and welded and has special design grates.

Write for the new Wise catalog, No. 23, just out and special circulars illustrating these New Wise Furnaces and features in detail. Be a Wise dealer now and for all time.

The Wise Furnace Company
AKRON, OHIO

OPTIONAL

Choice of triangular, revolving grates or flat grates with waist high shaker; and either seamless, all cast iron radiator, or permanently sealed steel plate radiator. Let us tell you more!

UTICA HEATER COMPANY, UTICA, N. Y.
 DIVISION OF NATIONAL PRODUCTS CORPORATION
 2445 N. KEELER AVE. CHICAGO, ILL.

Makers of Superior Pipe and New Idea Pipeless Furnaces



Seamless All Cast Iron Radiator

No joints to develop gas leakage. Deep, broad heating surfaces and liberal air passages. Unsurpassed for soft coal or wood.

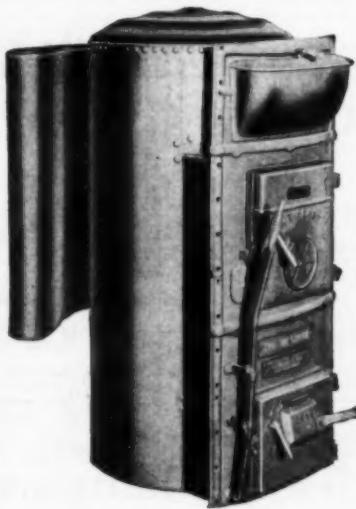


Steel Plate Radiator

Responds quickly and gives good results with hard coal. All seams are safely and permanently sealed with special asbestos cement.

SUPERIOR WARM AIR FURNACE

SUPERIOR DEALERS ARE EXCEPTIONALLY LOYAL—Why?



Above—Western Furnace completely assembled at factory to insure perfect fit of all parts.

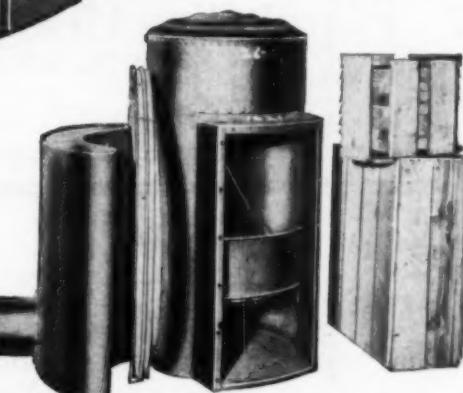
Right—Western Furnace knocked down after assembly and crated for shipment.

"western"
Boiler Plate

Furnaces are Quickly Assembled

Complete assembly and thorough inspection at the factory insures perfect fitting parts. Sections are clearly numbered—on the shipping cartons as well as on the furnace itself. This means speed in assembling without fitting.

The Western Furnace has many other practical features of design which make it an unusually easy and satisfactory heater to sell. Joints in the boiler are riveted with cold driven rivets and seams are tightly calked in addition, making the strongest, tightest and most permanent construction known. The radiator walls are made of a single sheet and front extension is one piece with the body. Collar connections have telescopic joint, asbestos packed. Heavy double grates are easily shaken from a standing position. The corrugated dome which is an exclusive feature of the Western Boiler Plate Furnace greatly lengthens the life of the heater.



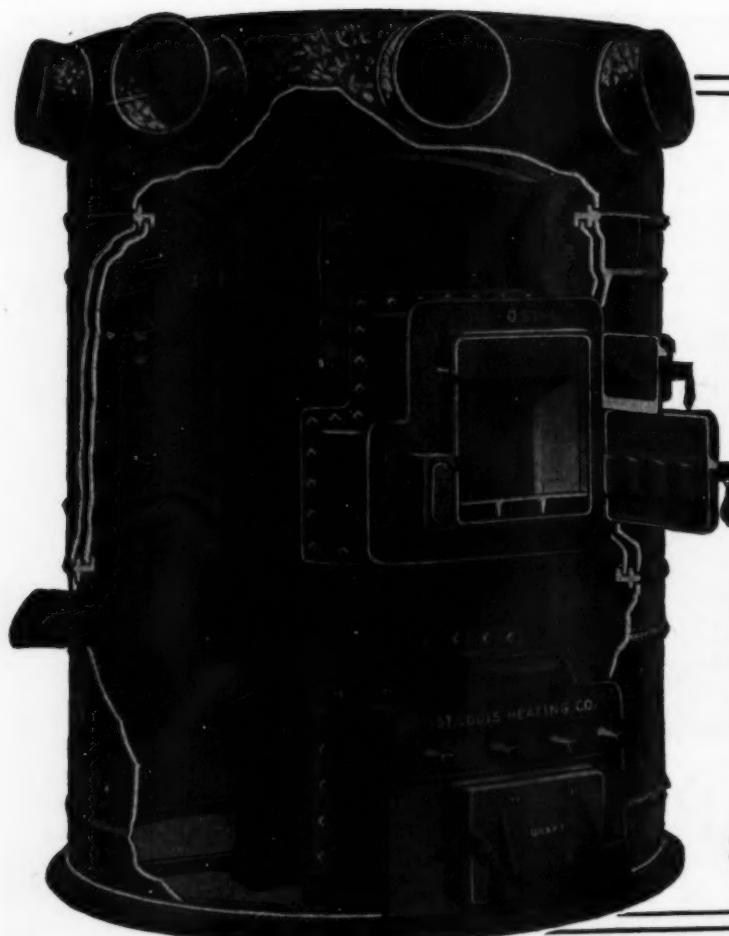
Western Steel Products Co.

130 Commonwealth Ave.

DULUTH, MINN., U. S. A.

Distributed by

Atlanta, Ga. Moncrief Furnace Company
 Pittsburgh, Pa. Wagener-Prole Furnace Co.
 San Francisco, Cal.
 ... Pacific Sheet Metal & Furnace Co.
 Ravenna, Ohio. Ravenna Furnace Co.
 Chicago. Western Steel Products Co.
 3025 W. Van Buren St.



**Only real quality
can make real
profits for you—**

AND when you decide to sell steel furnaces, which you will some day, remember that the construction of the furnaces illustrated here has the features of construction that have made

"HOME COMFORT"
(TRADE MARK REGISTERED)
Steel Furnaces

famous favorites for over half century

True their construction has changed with time, but only when real quality features could be added. Recent improvements on Home Comfort furnaces have increased their heating surfaces and made them more efficient and economical consumers of fuel. (Notice the gas and soot consuming features shown on the feed door.)

We have a special circular called "A Dozen Appeals to Reason" which points out some of the "Home Comfort" features. Write for it today.

ST. LOUIS HEATING CO.
2901-11 Elliot Ave., St. Louis, Mo.

PITTSBURGH DISTRIBUTOR
Wagener Bros., 3005 East Street



A high quality furnace designed according to the Standard Code requirements for Standard Code installations

**The NEW FLORAL CITY
QUEEN FURNACE**

THE size of the casing and the relation of radiating surface to grate area have been carefully figured out according to the Standard Code and the ratings on this furnace are also as determined by the Code. That's a good selling point to make along with your Code installation—a real Code furnace.

Here are Some of the New Features:

1. Large one-piece cast radiator with extra large opening from combustion chamber with direct-indirect draft damper.
2. Smoke and cleanout collar extend through the casing and front. Throats of feed door and ash pit extend through front and both doors and throat are disc ground to insure perfect fit.
3. Only four joints inside casing and these joints are extra deep covered joints.
4. Extra large water pan—lever shaker handle—rocker type grates—heavy ribbed two-section straight fire pot—large one-piece roomy ash pit and other improvements.

Write for our agency proposition today

**Floral City Heater Company
MONROE, MICHIGAN**

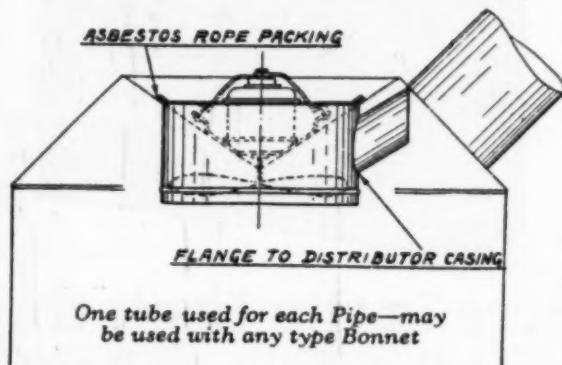
CHICAGO OFFICE
1654 Monadnock Building

DETROIT BRANCH
4452 Cass Avenue

The latest news about the Warm Air Heating Industry is to be found in this Journal every week.

This is the only trade Journal covering this field published every week.

*Forced Air
Heating is
Simple and
Efficient with the
ROBINSON
Heat Distributor*



Notice--forcing is flexible--directed to the pipe desired and as much as needed--

THE tube sizes leading to the heater pipes are measured according to the requirements of each individual pipe—tubes ranging from three to five inches may be used.

The ROBINSON Heat Distributor is equipped with a three-speed motor, giving an air delivery of 800, 1350 and 1500 Cubic Feet of Air Per Minute.

The ROBINSON Heat Distributor is easily installed in *any type* bonnet.

This is the Forced Air Unit being used by live dealers everywhere—write for construction details **NOW**.

Write for prices and installation directions today.

The A. H. ROBINSON CO.
MASSILLON, OHIO

**Convince
Yourself
First**

Getting business should not be hard, notwithstanding the popular belief. Of course, if you sell a commonplace furnace, your sales will not be nearly so great as if you sell a furnace that is 100% satisfactory.

Sell the 100% up-to-date furnace—the new Series "C" Moncrief. It's a furnace you could sell to your best friend and make him a better friend. The new Series "C" will put snap into your selling talk, pep into your business, and plenty of money into your pocket-book.

Are you going to write for details today, or will you keep on putting it off?

**The HENRY FURNACE
& FOUNDRY CO.**

3471 E. 49th St. Cleveland, Ohio
*We supply everything used
on a warm air heating job.*

Distributors:

Carr Supply Co., 412 No. Dearborn St., Chicago, Ill.
Johnson Furnace Co., Kansas City, Mo.
Moncrief Furnace Co., Atlanta, Ga.
Moncrief Furnace & Mfg. Co., Dallas, Texas
E. W. Burbank Seed Co., 29 Free St., Portland, Me.
J. F. Conant, Railway Terminal Warehouse,
Troy, N. Y.
Wilkes-Barre Hardware & Stove Co.
18-20 So. Washington St., Wilkes-Barre, Pa.



**MONCRIEF
FURNACES**

**REPAIRS
for
STOVES
and
FURNACES
and
BOILERS**

**Send for these
illustrated
order blanks
today—**

*We have the largest and
most complete stock of ~*

STOVE, FURNACE & BOILER REPAIRS

NORTHWESTERN STOVE REPAIR CO.
CHICAGO - ILLINOIS

**EASY
TO INSTALL**

**CLAMPS
ON**

**NO
BOLTS**

REVERSIBLE

**CUTS
LABOR $\frac{1}{3}$**

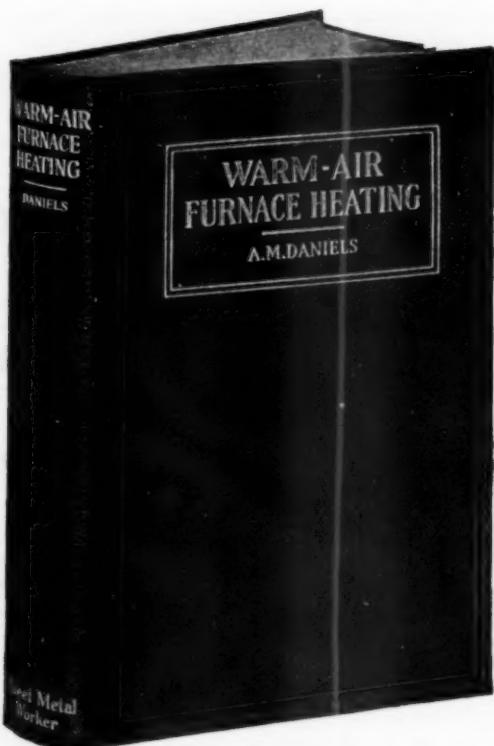
**EASY TO
REMOVE**

**NO TEE
JOINT**

WRITE FOR PRICES

TEELA SHEET METAL CO. — OSHKOSH, WIS.

The NEW TEELA BOLTLESS
REVERSIBLE
CHECK DRAFT



**Here is the book they
are all talking about—**

Just off the Press—Now ready for you

IT IS the book that you have been asking for—a book on Warm Air Furnace Heating that is UP-TO-DATE—a book that covers every phase of the subject giving exact data based on research work.

Written by A. M. Daniels.

Here is the book that will enable both the experienced furnace man and the student to obtain a working knowledge of up-to-date scientific warm air furnace heating.

It covers the subject completely.

Many tables are included and some big labor savers in calculating pipe sizes—also many diagrams.

450 pages, 7x9 inches

**Bound in semi-flexible imitation leather--
Stamped in gold--**

PRICE \$5.00 POSTPAID

Send in your order today

AMERICAN ARTISAN,
620 So. Michigan Ave., Chicago, Ill.

Enclosed find \$5.00 for which send me WARM AIR FURNACE HEATING by A. M. DANIELS.
10% discount allowed on book and renewal subscription if ordered together.

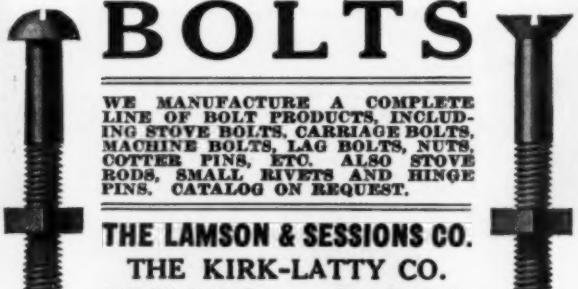
Name.....

Street Number.....

Town..... State.....

When writing mention AMERICAN ARTISAN—Thank you!

BOLTS



WE MANUFACTURE A COMPLETE LINE OF BOLT PRODUCTS, INCLUDING STOVE BOLTS, CARRIAGE BOLTS, MACHINE BOLTS, LAG BOLTS, NUTS, COTTER PINS, ETC. ALSO STOVE RODS, SMALL RIVETS AND HINGE PINS. CATALOG ON REQUEST.

THE LAMSON & SESSIONS CO.
THE KIRK-LATTY CO.
1971 W. 85th St. Cleveland, O.

**PATTERNS FOR STOVES
AND HEATERS**

THE CLEVELAND CASTINGS PATTERN COMPANY
CLEVELAND, OHIO

PATTERNS
FOR STOVES AND HEATERS
VEDDER PATTERN WORKS

FIRST-CLASS
IN WOOD and IRON
ESTABLISHED 1885 TROY, N.Y.

**IRON AND WOOD
STOVE PATTERNS**
QUINCY PATTERN COMPANY
QUINCY, ILLINOIS



The AUERISTOCRAT

of all registers, combining air capacity, decorative and concealing features.

Designed to conform with the Standard Code so they fit all standard boxes.

Auer Patented mechanical features make it perfect in operation,—quick and easy to install.

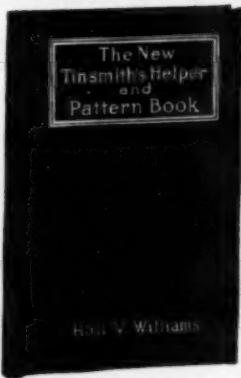
Auer's Save Hours and Dollars

The AUER REGISTER CO.
Cleveland, Ohio

352
Pages

247
Figures

165
Tables



*Flexible
Leather
Binding*

*Measures
4½ x 5 in.*

One of the Best and Most Popular Books

on tinsmithing and elementary sheet metal work. This is the latest edition and the contents are new excepting the chapter on Mensuration, which has been re-arranged and amplified, and possibly some fifty pages of problems and tables which are classified to the phase of the work they cover.

This Book Covers Simple Geometry and Every Phase of Modern Pattern Cutting

from the making of every type of Seam, Lap and Joint, to Conical Problems and Tinware, Elbows, Piping, Ducts, Gutters, Leaders, Cornice and Skylight Work and Furnace Fittings.

In fact an excellent all-around book for every man in the trade. Mr. Williams writes in an easy-to-read, helpful manner, giving you all the necessary details about each subject he handles.

You should add this widely read book to your collection now.

PRICE \$3.00

**AMERICAN ARTISAN
AND
HARDWARE RECORD**

620 South Michigan Avenue, Chicago, Ill.



"GEM" ADJUSTABLE REGISTER SHIELDS

Permanent Oxidized Copper Finish

It's easy to interest neat, thrifty housewives in "Gem" Shields, as they protect walls and ceilings from register dust, dirt and soot, and so help to reduce the labor and expense of frequent curtain renewals or launderings.

"Gem" Register Shields are *easily adjustable*, fit all size registers, save fuel, and attractively blend in with any scheme of interior decoration.



Floor Shield retails at \$1.50;
Wall Shield at 75c.

BUY FROM YOUR JOBBER

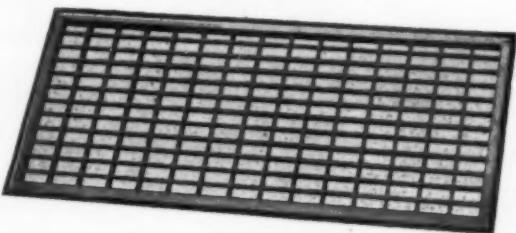
1140 BROADWAY, NEW YORK, N.Y.



New!

"Fabrikated" Cold Air Faces

82% Open Area



NOW MADE WITH BEVELED EDGES

"Fabrikated" Faces are rigid and do not sag or change shape in use. Any size. Any finish. You certainly should look into "Fabrikated"!

INDEPENDENT REGISTER & MFG. CO.

3741 East 93rd St.

Cleveland, Ohio

New York State Branch: 150 Colvin St., Rochester, N.Y.

Founded 1880

American Artisan
and Hardware Record

Sheet Metal Work-Warm Air Heating

Published to Promote
Better
Warm Air Heating
and
Sheet Metal Work

Published EVERY SATURDAY at 620 South Michigan Avenue, Chicago

ADVERTISING AND EDITORIAL STAFF

Etta Cohn Franklin Butler G. J. Duerr
J. F. Johnson Chas. E. Kennedy Frank McElwain

Eastern Representatives: M. M. Dwinell, J. S. Lovingham, 156 Fifth Avenue, New York City

Vol. 94, No. 24

CHICAGO, DECEMBER 10, 1927

\$2.00 Per Year

Table of Contents

Page	Page		
Sheet Metal Department.....	67 to 77	Describing a Few of the More Prominent Methods of Pattern Drafting, by O. W. Kothe, Principal St. Louis Technical In- stitute	74
Steel Hangar Gives Protection to Private Planes at Paul-Waukee Air Post.....	67	Random Notes and Sketches, by Sidney Arnold	78
Making Buildings Lightning-Safe, by R. D. McDaniel	69	Warm Air Heating and Ventilating Depart- ment	79
Greater Chicago Warm Air Heating Associa- tion Meets at Sherman Hotel.....	70	Gas-Fired Warm Air Furnace Costs 15 per Cent Less to Operate than Steam.....	79
Farm Building Ventilation Offers Wide Range for Sheet Metal Contractor's Inventive Genius, by Professor A. J. Mack.....	71	How Do Propeller and Centrifugal Fans Per- form in Given Duties? By E. W. Petersen..	83
		Markets	86

PROFESSOR A. J. MACK ON FARM VENTILATION

Sheet metal contractors doing business in rural communities are constantly coming into contact with a demand for the construction and installation of ventilating systems particularly adapted to the ventilation of farm buildings. This demand leads to considerable complexity on the part of the sheet metal contractor because of the multi-varied employments of ventilation in this type of work. A cattle housing requires one type of ventilation, while a hay mow may need an aeration system entirely different.

In order to set sheet metal contractors right on this subject of farm ventilation and to give them facts which they can use to advantage, AMERICAN ARTISAN has secured an exclusive series of articles on this subject from Professor A. J. Mack, Department of Mechanical Engineering, Kansas State Agricultural College, Manhattan, Kansas. The first of this series appears on page 71 of this issue. Please turn to that page.



The nation's strength is the nation's health
Buy Christmas Seals and help preserve it

THE NATIONAL, STATE, AND LOCAL TUBERCULOSIS ASSOCIATIONS OF THE UNITED STATES.

Say you saw it in AMERICAN ARTISAN—Thank you!

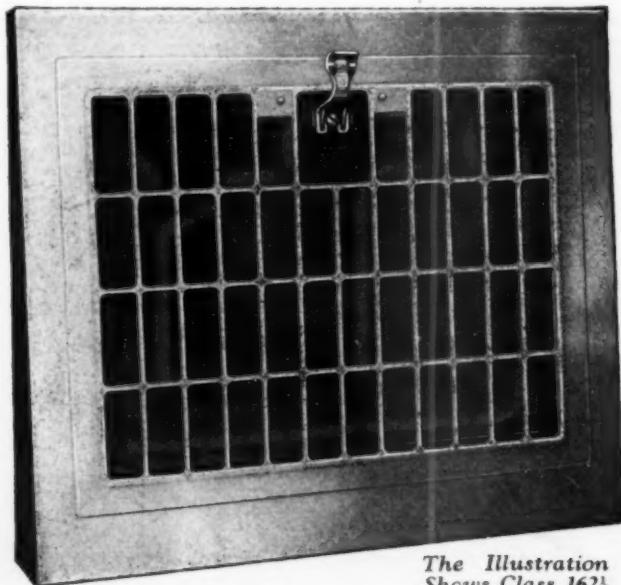
THE ONE-PIECE 160

WITH

Pinched-back Fretwork

New!

FOR
1928
BUSINESS



The Illustration
Shows Class 162 $\frac{1}{4}$
—Size 9x12

A NEW BASEBOARD
REGISTER with
large free air capacity,
pinched-back fretwork,
beautiful lines, and
NEW LOW PRICES!

Furnished in all standard
sizes and finishes.

THE HART & COOLEY MFG. CO., NEW BRITAIN, CONN.

Manufacturers of Registers, Wrought Grilles and Radiator Enclosures

New York
501 Fifth Avenue

Chicago
61 W. Kinzie St.

Philadelphia
Real Estate Trust Building

(WESTERN WAREHOUSE AT CHICAGO)

WROUGHT
STEEL



WARM AIR
REGISTERS

"The Air Capacity Line"

Mention AMERICAN ARTISAN in your reply—Thank you!



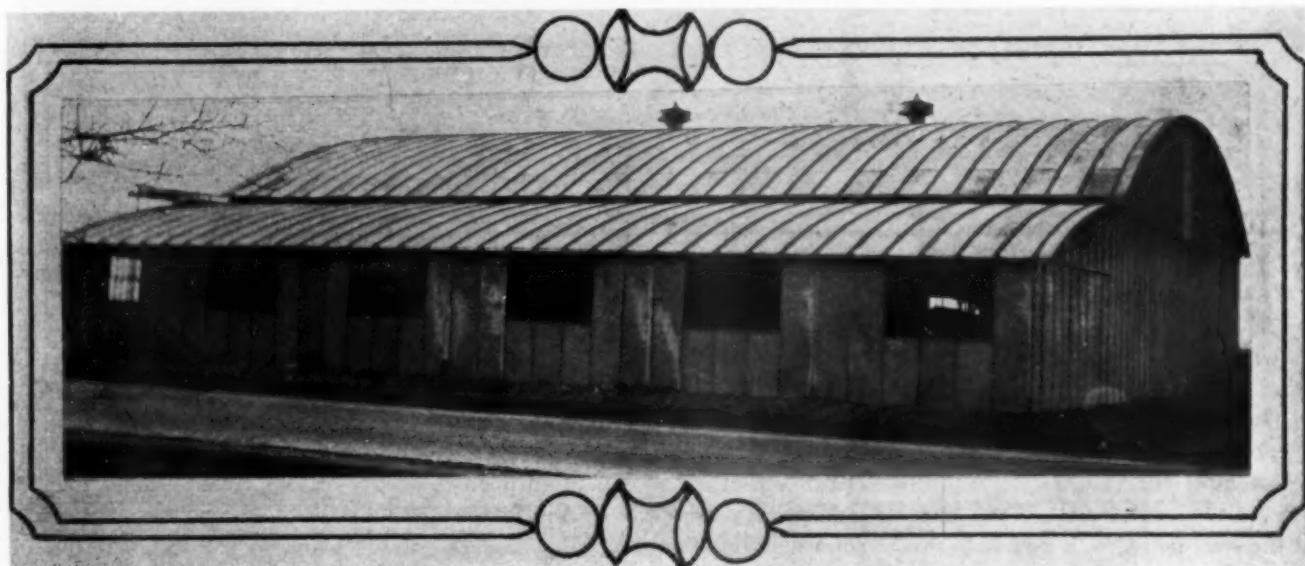
American Artisan and Hardware Record



Vol. 94

CHICAGO, DECEMBER 10, 1927

No. 24



Side View of All-Steel Aeroplane Hangar at Pal-Waukee Air Port, Milwaukee Avenue and Palatine Road, Northwest of Chicago, Erected by Trachte Brothers, Madison

Steel Hangar GIVES PROTECTION to Private Planes at Paul-Waukee Air Port

*Provides Protection from Moisture and
Fire—Gives Easy Ingress and Egress*

WHEREVER the march of progress has taken man—on land, on water, under the water, or in the air—that progress would have been well nigh impossible without the aid of steel in its many forms. Even Arthur Conan Doyle in his latest flight of imagination, "Marcot's Deep," would have found it impossible to permit Marcot, the great scientist, to carry on his observations without the assistance of steel.

In the air particularly men have found steel of great service to them, with its lightness in weight and extreme tensile strength, its ductility, its imperviousness to both fire and slower process of oxidation, rust.

But aeroplanes require to be protected from moisture and exposure when not in use. For this purpose

hangars are built, structures that will permit the easy housing of the planes at the flying field.

The two accompanying illustrations show an aeroplane hangar at the Paul-Waukee air port, located about eighteen miles northwest of Chicago on Milwaukee Avenue at the Palatine Road. These illustrations show the front, side, rear and top views of the hangar. The roof is of the curved standing seam type, considered to be quite difficult to accomplish.

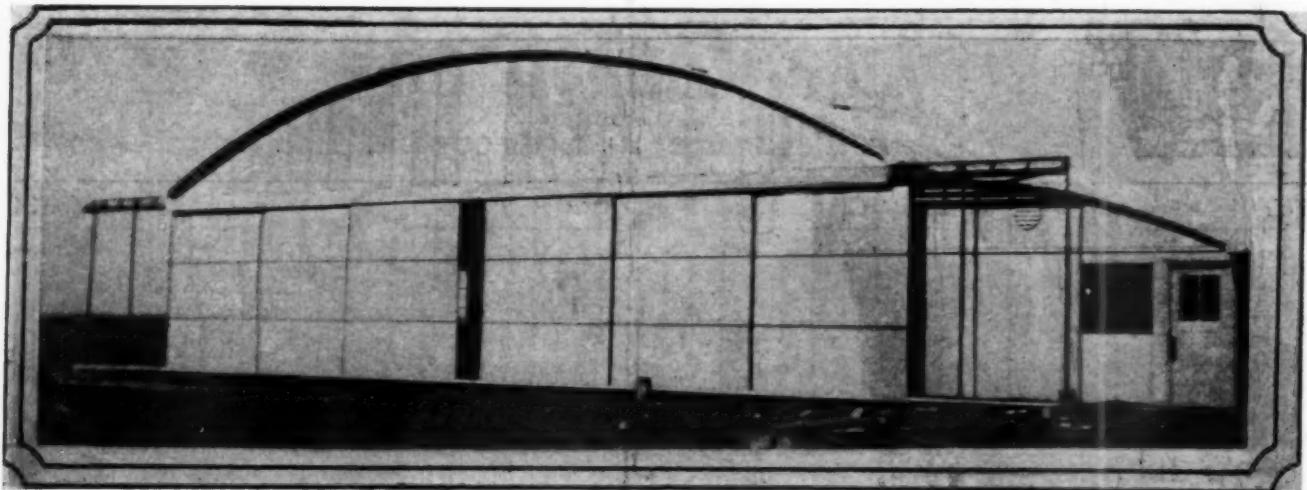
The hangar has a concrete floor, and is thoroughly ventilated. The entire structure is made of sheet metal, insuring the planes contained therein against destruction by fire and moisture. The front view shows how the doors were hung so as to overlap one another and run-

ning upon tracks that permit their easy opening and closing.

With the increased use of the air for transportation purposes there will come an increased prevalence of this type hangar at the air ports throughout the country for the simple reason that they can be erected so much more economically and they do the work for which they are designed so much more efficiently than the wooden structure does. This hangar houses six or more planes many of which are owned by private citizens.

The hangar was erected by Trachte Brothers, Madison, Wisconsin, and the peculiar construction of the roof is an idea patented by that company.

In one of the other illustrations which accompanies this article the



Front View of Steel Aeroplane Hangar Which Insures Protection to Private Planes at Pal-Waukee Air Port, Chicago

inside of the roof construction is shown to a better advantage. This interior illustration, however, is not of the hangar, but of an auto laundry, but the construction is identical with that of the hangar.

This type of structure, say men in the steel industry, is bound to increase in popularity, because of its

extreme utility value. It can be erected at a minimum of cost. It is absolutely fireproof and lightning-proof. It is impervious to the slower processes of oxidation—rust. It can be set up at will in an open field, over a driveway or any other convenient location, according to the wishes of the builder.

**Artisan Produces
Results for B. Butchart,
Natchez, Mississippi**

I want to thank you for running the ad for me, and I certainly got plenty results from same, and I think I have gotten hold of the fellow I want, so you can take the ad out.

B. BUTCHART.



Interior of Auto Laundry Showing Roof Construction Identical With That of the Steel Aeroplane Hangar and Patented by Trachte Brothers

Making Buildings LIGHTNING-SAFE

By R. D. McDANIEL*

NOTWITHSTANDING the tactics of the lightning rod salesman of a generation ago, and the period immediately following, when the subject of the lightning protection was almost passe, the general public, especially in the farming communities of the sections subject to electrical storms, are now pretty nearly sold on the need for lightning protection. Scarcely a farm building of any consequence can be found in the Middle West, at least, that is not protected from lightning damage.

Insurance Experience

The records of the mutual insurance companies specializing in the insuring of farm property indicate that on the property insured the losses due to lightning are as low as a ratio of 1.3 to 100 as between protected and unprotected buildings—or, in other words, protection is about 98 per cent or 99 per cent efficient. Many of the farm mutuals, in fact, will only insure protected property, while others make a substantial reduction in rates on such buildings.

Generally speaking, it is usually considered that a building to be protected should be equipped with a standard rodding system. There has been, indeed, much controversy among manufacturers of rods and among various "authorities" as to the essential features of the component parts of such a system. For instance, should the material used be iron, copper or aluminum; should it be solid or woven, and, if solid, of round or square cross section; how many points should there be, and how high, and should they be plain or ornamental?—and so on, *ad infinitum*.

Favors Grounded Metal Roof

The question at once presents itself: Why not a grounded steel roof? Well, why not? In an ad-

dress on "Lightning" before the Franklin Institute of Philadelphia, in September, 1924, Mr. F. W. Peek, Jr., of the General Electric Company, gave a very conclusive account of his experiments with high voltages in which the actual conditions incident to the static discharges known as lightning were simulated as nearly as possible. In respect to the protection of buildings, Mr. Peek said, "It seems that the best results can be obtained with plain, inconspicuous rods" and "A grounded metal roof would seem almost ideal protection."

For a number of years a group of mutual insurance companies specializing in flour mills and country grain elevators has been advocating the grounding of metal roofs as a protection against lightning. Where this is done in the prescribed manner, a credit is allowed in the fire insurance rate. Our company, the Grain Dealers' Mutual of Indianapolis, specializes in and, in fact, is the largest insurer of country grain elevators in the world, which class of risk is perhaps more susceptible to lightning damage than farm properties. These are usually the highest buildings in the vicinity, of frame construction, and contain more or less highly combustible dust which is easily ignited by a static spark. In our twenty-five years' experience we have not suffered a lightning loss of any consequence on an elevator having a properly grounded metal roof. This, to us at least, is sufficient evidence that the protection thus afforded is adequate.

How Lightning Travels

Experiments carried on by the German scientists, Kayser* and Rumcker, proved, some forty years ago, a lightning flash to be really a series of flashes, and that the succeeding flashes do not necessarily terminate at the same point as the initial flash. It is generally accepted that the first discharge ionizes a path through the atmosphere which is fol-

lowed by the succeeding flashes. This path, however, may be shifted about by the wind, thus causing what appears to be the same "stroke" to strike in different places. Rumcker tells of one instance wherein there was a shift of as much as thirty-six feet. This perhaps explains why rodded buildings are sometimes struck and damaged. In the case of a grounded metal roof, however, such a shifting would have no detrimental effects.

Sparks From Distant Strokes

The phenomena of sparks occurring between two pieces of ungrounded metal in a charged atmosphere upon the breaking down of the static condition is well known. Where there is highly combustible material, such as dust, lint or chaff, in immediate proximity to the metal, a fire may be caused just as much from lightning as though the building had been in the path of the discharge, whereas it may have been half a mile distant. Mr. Peek in his experiments demonstrated the impossibility of causing sparks between points within a completely enclosed metal tank, either by direct stroke, electromagnetic induction or electrostatic induction. Under certain conditions it was possible to obtain small sparks by electromagnetic induction in partially enclosed metal structures. A completely metal clad building approaches very nearly the first condition—certainly the latter—which leads us to believe that such a structure, properly grounded, is not only practically immune from damage from direct lightning strokes, but is also fairly safe from damage due to induced static discharges within the building itself. This is protection not obtained with a rodding system on a non-metal covered structure.

For Absolute Protection

It is desired that it be clearly understood the building must be completely covered—roof, sides, eaves and cornice—before protection can

*Manager Service Department, Grain Dealers' National Mutual Fire Insurance Company, Indianapolis.

be obtained from grounding the siding. If the roof only is metal, then it must be grounded directly; if roof and sides are metal, but eaves and cornice open, then the roofing and siding must be bonded. For the bonding and grounding standard lightning rod cable is preferred. Joints must be tight without soldering and care taken to avoid bends of less than one foot radius. Furthermore, any masses of metal, such as a track for a hay fork, should be bonded to the roof or siding or grounded independently. Chimneys, other than metal, if projecting above the ridge of the roof, should be protected with an aerial terminal attached to the roof.

Ground Connections

The ground connections are all important. The more such connections, the better production. For a square or rectangular building not exceeding, say, thirty feet to a side, grounds on diagonally opposite corners are generally sufficient; for an L-shaped building three grounds are necessary, etc. When in doubt, play safe. The purpose of the system is to furnish a path of low resistance to the earth and the resistance of the ground connections varies approximately inversely with the number of such connections. These connections may be made by driving a one-inch iron rod to permanently moist earth (at least eight feet), or by extending a section of standard cable in the same manner. All the above—and more detail might be added—may seem somewhat involved, but actually such a system is quite simple. Lightning is utterly devoid of sentiment and does not hesitate to take advantage of a shoddy piece of workmanship; care should therefore be taken that the bonding and grounding are carefully and completely done. Connections, of course, must not be made over a rusty or painted surface, nor should it be expected that loose or rusted out iron will offer any worthwhile degree of protection.

Summary

Just as there is no question but that a lightning rod system is well worth its cost on non-metal covered

buildings, so it is true that even more security is obtained at considerably less cost by bonding and grounding if the building to be protected is covered with metal. The fact that lightning protection can be obtained at a very low cost, usually a cash outlay for only a few feet of

cable, should prove interesting to the purchaser of sheet metal who is desirous of obtaining a building both weather-proof and lightning-proof and fireproof as well.—"Making Markets," August, 1927 (*Sheet Steel Trade Extension Committee*).

Greater Chicago Warm Air Heating Association Meets at Sherman Hotel

Standard Code Application Explained in Detail to Members

THE Greater Chicago Warm Air Heating Association held its regular meeting in the Hotel Sherman, Chicago, Monday evening, December 6. Although the attendance was not quite 100 per cent, the approach to that figure was near enough to show that the members are all intensely interested in the work which the association is now carrying on.

One important work which this association has set itself the task of accomplishing is the education of its members in the proper use of the Standard Furnace Code. To this end some member of the association usually devotes a portion of the evening to the expiation of the Code and its constitution and application after the regular business of the meeting is gotten through with. This adds interest.

At the meeting on Monday evening Ed. Stahler, of the G. & S. Stove & Furnace Company, with the use of the blackboard, took that portion of the Code which deals with heat losses through wall, glass, and infiltration and demonstrated how the various heat loss factors are applied, to the edification of many of the members.

This education of the members is only one of the many benefits the association is offering its membership. The men who comprise its membership are all men who are intensely interested in the development of the warm air heating industry to its fullest possible extent. They are not content to let well enough alone, but are working en-

ergetically to remove the obstacles which are largely responsible for the failure of the warm air heating industry to take its proper place in the service of the public in cities, big and little alike.

The men who are in this organization are men who have faith in the industry and who do not wish to be caught napping when the public finally comes to a full realization of the superior service which the warm air furnace can render it. They want to be the ones on the firing line when that time comes, and to this purpose they are preparing themselves in the best way possible—by mutual cooperation among themselves.

This Greater Chicago Warm Air Heating Association is a comparatively new organization. But this does not detract from the good work it has already accomplished and is in a fair way to accomplish for its members in the near future. It is making splendid progress.

It is the intention of the association to close its membership at the charter rate and when this is done the initiation fee will be hiked considerably.

After the regular meeting the members were told about the proceedings of the National Warm Air Heating and Ventilating Association and the Western Warm Air Furnace and Supply Association meetings held last week. George J. Duerr told about the National meeting and E. C. Carter told about the Western meeting.

Farm Building Ventilation Offers Wide Range for Sheet Metal Contractor's Inventive Genius

Much Information Made Available by U. S. Department of Agriculture and College Experiment Stations

By Professor A. J. MACK*

IN RECENT years much scientific work has been done on ventilation problems. This work has consisted in the determination of the ventilation requirements of many classes of enclosures. This in turn has led to the design of many kinds of ventilators and ventilating systems.

The ventilating requirements of the various classes of buildings differ greatly. In those buildings in which human beings or animals must spend considerable time, health

and comfort are of primary importance. In some classes of build-

ings ventilation is beneficial in the prevention of loss by decay. It can readily be seen



Figure 1.—Types of Automatic Ventilators Classified As Plain Stationary.

ings ventilation is beneficial in the prevention of fires. In others it is

that a school, auditorium or church would have entirely different needs than a dairy or stock barn. Again, fruit or vegetable storage ventilation needs would be greatly at variance from either of these.

The United States Department of Agriculture, the United States Bureau of Standards, and the various college experiment stations have carried on a great deal of investigation on the requirements of various classes of buildings and of means of meeting these requirements. Much information has been given out in bulletins issued by these agencies.

These bulletins deal with the various requirements, also the effectiveness of various classes of equipment. They possibly do not have the wide distribution which they deserve. At any rate, the ventilating engineers' field of prospective installations is unlimited. This is especially true in farm ventilation. While the individual installations may not be large, the lack in size can be compensated for by the numbers of installations.

*This is the first of a series of articles on Farm Ventilation written exclusively for AMERICAN ARTISAN by Professor A. J. Mack, Department of Mechanical Engineering, Kansas State Agricultural College, Manhattan, Kansas. The remainder of the series will follow in close order.



Figure 3.—Types of Automatic Ventilators Classified As Plain Rotary.



Figure 2.—Types of Automatic Ventilators Classified As Stationary Siphoning.

It is a question of convincing the prospective customer of the advantages of proper ventilation, and of the actual needs and economic results to be secured. This will justify the expense of the installation. Some arguments along these lines will be presented in this series of articles on various classes of farm ventilation.

Before going into details on the requirements of various classes of buildings a discussion of a class of equipment most extensively used for this class of ventilation will be in order.

The Automatic Roof Ventilator

The automatic roof ventilator and its possibilities should be of interest to sheet metal workers interested in ventilation. It has almost universal use as a piece of ventilating equipment, whether the job be a large or a small one.

It is very well adapted to those classes of buildings where very close regulation is not of primary importance. In recent years it has come into great prominence due to publicity given to the scientific investigations carried on. This investigation has resulted also in many improved designs. It has a distinct advantage in that no mechanical or electrical power is required for its operation. This makes it especially adapted for all general farm ventilation.

The requirements of a successful

roof ventilator are numerous. It must be strong enough to withstand all weather conditions to which it may be exposed. It must have incorporated a protection against the entrance of rain or snow into the enclosure. It must be so designed as to permit ready exit for gases,

dusts and vapors at all times, and must not be affected by down drafts when the winds blow.

Commercial ventilators are made in both stationary and revolving types. In some cases in both types an attempt has been made to take advantage of the winds in producing increased drafts. In some cases this has been successful, while in some cases it has not. In general the automatic ventilators can be grouped into four classes, namely: plain stationary, stationary siphoning, plain rotary and rotary siphoning. The so-called siphoning classes are those which have special ducts or flutes intended to make use of the velocity of the wind in producing additional draft. A fifth group, consisting of exhaust fan types or air turbines, could also be included.

Figure 1 represents ventilators of the plain stationary type.

Figure 2 represents ventilators of the stationary siphoning type.

Figure 3 represents ventilators of the plain rotary type.

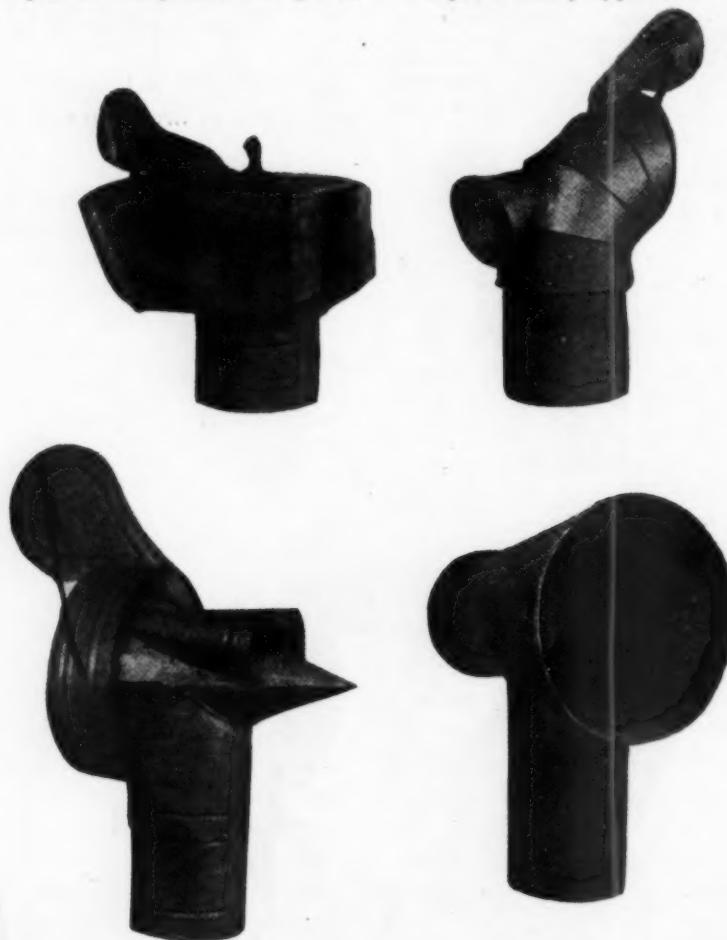


Figure 4.—Types of Automatic Ventilators Classified As Rotary Siphoning.

Figure 4 represents ventilators of the rotary siphoning type.

Figure 5 represents ventilators of the air turbine or exhaust fan type.

Various experiment stations have done work in investigating the effectiveness of the various types. The Engineering Experiment Stations have done considerable work along this line.

The results of the tests on a large number of ventilators indicate chiefly that the greatest factors contributing to the effectiveness of automatic ventilators are:

1. Large projected area exposed

air should be as straight as possible. If turns are necessary, they should be smooth and well-rounded.

5. The freedom of obstructions in the path of egress. The effectiveness of a ventilator may be materially lowered by obstructions. Consequently, they should be eliminated to the largest possible extent.

6. Making use of the wind working as an ejector. Any provision whereby the vacuum created by the wind is increased or made more effective will produce added ventilator effectiveness.

7. The use of the wind as a



Figure 4.—Rotary Siphoning Type.



to the wind. A large area produced a larger low-pressure area and a better exhaust.

2. Ample area of exhaust passages. The area for the passage of the air leaving the ventilator should be at least as large as the cross-sectional area of the inlet pipe. In the case of stationary types of ventilators it should be larger, as most of the gases must pass out on the leeward side when the wind is blowing.

3. Preventing the entrance of wind. Air which enters the ventilator must be exhausted, and unless provision is made for the removal of the additional air or prevention of its entrance, the capacity of the ventilator proportionately is decreased.

4. The straightness of the path of egress of the air. Abrupt turns in the passage of the air introduce friction. The path of the outgoing

source of power for driving exhaust fans. This is the principle involved in a special type sometimes called air turbines. This will offer somewhat of a basis for selection of a suitable ventilator for various purposes.

This concludes the first of a series of articles on Farm Ventilation.

The second of the series of articles on farm ventilation by Professor A. J. Mack will follow in a near issue of *AMERICAN ARTISAN*. Watch for it!

Have You "Guts" Enough to Get Your Price?

Stabilizing business does not mean to put business in so many stables, like a line of horses up against so many feed troughs, but one thing we do know and that is

that there are plenty "mules" in business that need stabilizing.

What do we mean by stabilizing? Simply this: The other day we called on a man and had quite a chat with him on the subject of how to grow the feeling of having wings at the end of a business year. It soon developed that he knew that I knew that he didn't know a lot of things he should know. We started to bake a nice business cake for him, and before we got through we put a nice lot of icing on it and decorated it with silver balls and green leaves—but the proof of the cake is the eating. Did he eat it?

He did not! Because it wasn't very long afterwards when occasion demanded that we call on a fellow tradesman nearby.

After listening to the many tales of woe about the other fellow's potatoes being better and bigger and finer and sweeter, it gradually simmered down to a thorn in the flesh, and after putting on some soothing syrup we finally got the story.

Both contractors put in a bid for a new roof. The first man's bid was \$100, and the second man's bid, which was the legitimate and rightly-figured bid, was \$150, but with the customer the second bid was in the category of "also ran." Was the second bidder hot under the collar? Well, you can guess, and he was rightfully peeved, because the first fellow did not only know his onions, but proved to us that after we baked a business cake for him, he even refused to smell it.

So if you boil off all the froth of fret and worry, stabilizing our business is nothing more or less than learning how to estimate properly—and that's something to think about—because you must

Figure accurately the cost of material,

Figure accurately the cost of labor,

Figure accurately the cost of overhead,

Add your profit and then be a man with guts enough to get your price.

That's that.

Describing a Few of the MORE PROMINENT Methods of Pattern Drafting

Developing Truncated Cylinders and Radial Line Methods

By O. W. KOTHE, Principal St. Louis Technical Institute

YOUR trade from which you make your living is made up of three great divisions of science: the geometrical, mathematical and practical mechanics. In geometry everything you make, every tool and machine you handle, every piece of iron or steel you shape up to make something takes on certain geometrical lines. So that the greatest valuable thing a person can acquire is how to juggle geometry around to make the thousand and one things your trade is composed of.

Sheet Metal Trade Divide Into Three Parts

Along with geometry goes the second great division, mathematics, because efficiency of design can never be accurately or scientifically established without a knowledge of its size, its shape, its weight, its strength, the space it occupies, etc. The importance of this is easily observed today where we have scientific formulas for figuring many engineering problems of the trade—where in the past generations such sizes, thicknesses, weights, etc., were established first by guesswork, then by custom, and later it became a copy affair. But today, due to research authorities as well as some very enlightened tradesmen, nearly everything you make or work on can now be figured in terms of mathematics.

And third comes the great division of practical mechanics. It is this that the great masses of our trade follow and even much of this imperfectly. We can easily say your trade is divided into three mechanical functions and two-thirds for the technical functions. This accounts why tradesmen who are satisfied to remain with the power machines, and the hand tools—they seldom gain any promotion. They

are, in fact, only utilizing one-third of their trade, and so no responsible person will ever give a man charge of work where a 100 per cent trade wisdom is required.

Pattern drafting or laying out in itself is not all that is required. So many men of the trade who are more or less short-sighted want only a hand full of laying out problems, an elbow, a tee, a square to round, a tapering elbow, or some other pet idea he has acquired from someone who does not know any more than he does. Because he finds there is much more to be taught—he would sooner remain in oblivion.

Without a doubt ancient Egyptians were the first to know something of geometry. Their little valley ranges only from two to 33 miles wide, and through it flows the Nile River. Along the Nile are built mud huts that wash away in flood times, and that must be rebuilt when the river has returned to its bed again. It is claimed every Egyptian was taught geometry; no doubt to enable him to relocate his property lines by means of certain stakes or other land marks.

All Work in Present Steel Industry Has Geometrical Background

This we show in a measure in Figure 5, which shows how irregular plots can be re-established by using triangular measuring lines. Today it is claimed the Egyptians are still 92 per cent illiterate, and so we cannot place too much weight on their learning of geometry at any time, beyond to relocate their property boundaries and the planting of their own crops on their own soil.

But the use we make of geometry today is vastly different than its limited sense ages ago. Today in the iron or steel industry, all work

is geometrical; it is either made solid or hollow. In our trade we have largely to do with hollow objects, and, therefore, our drawing work is largely "surface development." The great aim is to visualize the lines on the surface of an object.

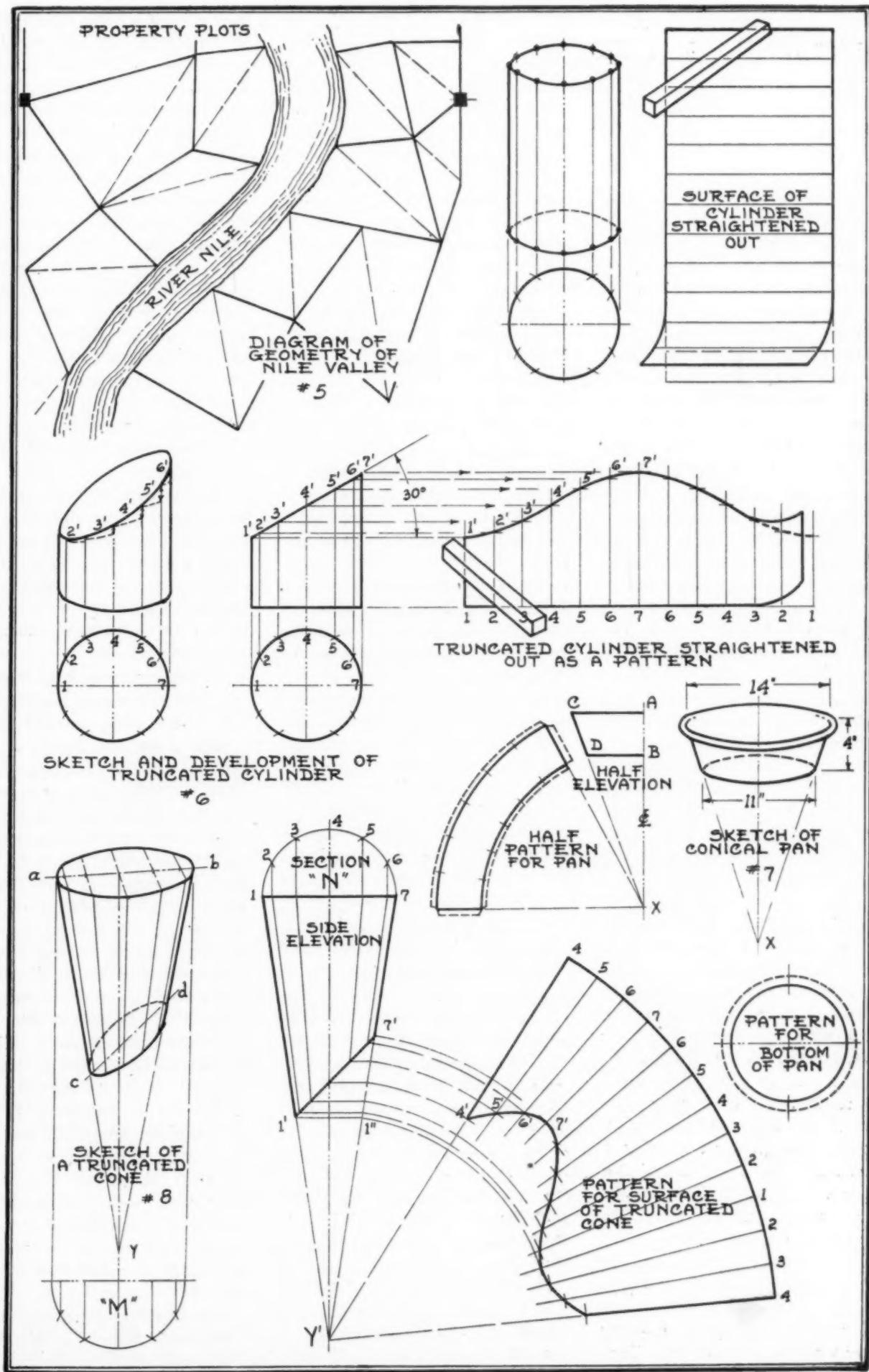
Thus the pipe sketch, to the right of Figure 5, is a cylinder. It can be quite thin metal, and it can have any desired thickness. But the lines we use are the developmental lines as becomes the problem.

Developing the Truncated Cylinder Also Important Factor

The circle beneath the sketch indicates the pipe is round, and if lines are passed up from points in the circle of equal division into the elevation sketch, these lines will also be of equal distance apart in the elevation. But owing to the convexed form, the more distant lines from the center recede from the eye, and pass around the convexed form. This makes those lines closest to the eye further apart, while those toward the sides closer together, but in the circle the divisions remain equally spaced.

This is further shown if we would cut the cylinder along the line, and then unroll it as at the right of sketch; it will give the true form of the pipe, and lines will be equally spaced. This principle will always work out accurately no matter what the diameter of the cylinder or the number of spaces placed in the circle, or the length of the cylinder.

Truncated cylinders, as at Figure 6, are identical to the straight cylinder, only with the top cut off on an incline. We should say that where a hexagon or octagon pipe is drawn, the bend lines form definite lines in elevation. But with a cyl-



Methods of Pattern Drafting

indrical shape, there are no definite bend lines, and so we mark these points in a circle to an equal division for convenience in handling. These points in the circle are then quite similar to fixed lines of an octagon pipe, or any other similar shape.

Now in our sketch to the left, the upper inclined elliptical shape indicates the cutting plane shown at the right or side elevation. Here we see the lines carried up from the plan will end in the ellipse, and each succeeding line is longer than the one below it. If we should pass horizontal cutting planes, as our dotted horizontal lines show, we have the distance that one line is longer than the other. The arrows indicate this as at 2'-3'-4'-5', etc.

Therefore, at the right of our sketch we have a true side elevation, with the line 1'-7' drawn to a 30-degree bevel as the cutting plane. Observe by dividing the circle in say 12 equal parts, or six for the half circle, and erecting lines, they must pass upward until they finish in the line 1'-7'. Then if we pass horizontal lines to the right we can easily measure how much longer each succeeding line becomes.

Now if we should take this truncated cylinder and cut it open on the line 1, and then roll it out as our pattern indicates, we would have all the lines and spaces, as well as length of lines identical as our elevation and plan shows. The distance 1-1 would be the circumference of pipe, also often called the girth. When the lines are erected from points 1-2-3-4, etc., it then becomes a "stretchout," where the entire surface is stretched out.

Then if we cut off these lines in stretchout equal in length to those in elevation, we have the correct layout, the same as if we cut the cylinder and unrolled it. Observe, it does not matter how you cut off the lines in stretchout, whether to project them as we show, or to use dividers and transfer lines, or to use a paper strip and transfer all lines bodily the same results can be secured.

This is what we call the "parallel

line method" because all lines run parallel to each other, and all projection work is also carried on in a parallel manner. It is this parallel line method that is used more abundantly than any other method of drafting, and is the most convenient and simplest to use. This method is used on all cylindrical pipe work for tees, elbows and its legion of fittings, as well as cornices, skylight work, metal windows, boilers, stack work, etc.

Showing Development of Radial Line Method Often Used

This is next in use, and is for all taper fittings as conical work. It is for tapering pipes or reducers, funnels, pitched covers, and all problems where the apex will be directly over the center of the base. Here all side lines taper to a common apex and the same unrolling can be applied.

Thus in sketch Figure 7 we have a sketch of a dish pan that is 4 inches high. Observe we mean the vertical height for this and not the slant height.

To develop this problem, first draw a vertical center line, and from it measure the height A-B, and then measure the half top and bottom diameters as A-C and B-D. This enables drawing the side line C-D, which is extended until it intersects the center line as in point X. Observe this makes a right angle cone as X-C-A-X.

So, by using X as center, and spanning the dividers to X-C and X-D, as radius, strike arcs. Now figuring the circumference for the top of pan, as $14 \times 3.1416 = 43.98$ or 44 inches, or 22 inches as the half circumference. This is then measured off on the large arc, and lines are drawn to the apex X, which also cuts off the bottom arc to the correct length corresponding to the diameter.

Some mechanics never think these things out properly, and it is not uncommon to see them measure off the circumference on both the large arc and the small arc. If both are done absolutely accurate, no harm should be met with; but in

most cases it is more difficult to get both to come out as correctly as where you would draw the radial line to the apex. Still other workmen forget on which arc they measure off the girth, and it is not unusual to observe the top girth measured off on the bottom arc or vice versa. Edges for seaming and enclosing the wire along the top must be allowed extra. All development work is net, so edges must always be allowed in addition.

Another problem that troubles most workmen who do not do enough drawing to get broke in properly is shown in Figure 8. This is a truncated cone, and nearly everybody at some time or other figures on treating the cone similar to a cylinder. That is the lines from the circle are brought direct to the apex. Now the circle does not taper like the cone; the circle "M" of Figure 8 is merely a section through the top base a-b. So that lines from section "M" are carried up into line a-b, where they start to taper from.

Truncated Cone Also Difficult Problem to Develop for Inexperienced

This is also shown in a more practical form in our side elevation, where the lines from section "N" first drop to the base line 1-7, and from here they are radiated to the apex Y'. Observe this is the same as squaring them to the ellipse of a-b, and then dropping the lines to the apex Y, which causes the lines to pass over the surface. Notice that where lines would be radiated direct from section "N" to the apex Y', the lines would not evenly distribute over the surface of the elevation; the further the section was removed from the elevation the greater the discrepancy.

Now if we cut off this truncated cone as on the line 1'-7' it would form an ellipse, as c-d of our sketch; the ellipse will not be uniform as the diameters at 1' will be smaller than those at 7', owing to the nearer the point 7' is with the top base.

We should also mention that our elevation lines as 1-7'-1' are lay-

ing on a flat surface, and as such, only the two side lines are true lengths. All the interior lines are foreshortened, because we cannot show the flare in an elevation drawing. This is shown in our sketch view, while the lines passing direct from center line a-b and c-d are identical to those of elevation. For this reason all foreshortened lines must be projected over to the true side line, as between 1"-7".

This transfers all the several elevation lines of a foreshortened position on the side line giving their true lengths. It is if though each of the elevation lines were laid over the side line 7-Y' in their true lengths. From here they can be used in developing the pattern.

To set out the pattern, we set compasses to Y' as center, and 7 as radius, strike an arc indefinitely. Next pick one of the spaces from section "N," as 1-2, and averaging it up to see this space corresponds with the rest; transfer these spaces on the large arc, as 4-5-6-7, etc., to 4. This makes 12 equal spaces, and is the circumference for the large base. Now draw radial lines from each of these points to the apex, and then with compasses, using Y' as center, and each of the points between 1"-7" as radius, strike arcs into stretchout. Where these arcs cross lines of similar number, as at 4'-5'-6'-7', etc., sketch a uniform curved line, and you have the pattern for truncated cone.

Such are the general principles for all conical flaring work, and while fittings will differ in size and in other ways, still these principles are fundamental and can be applied to all. Now and then certain adjustments must be made peculiar to the fittings involved; but that is a matter of applying your knowledge.

Art of Dividing Surfaces into Triangles Necessary

Triangulation is a wonder art of geometrical construction. It involves dividing surfaces into triangles, and then determining true lengths by means of the elevation altitudes and plan base lines or by other means of using the sections.

It is a wonderful method in that nearly every known fitting can be developed geometrically—if not always absolutely accurate owing to double curvature, etc., then at least to a very close approximation.

Now most workmen have received hand-me-down advice from others, who know very little about it, and their heartfelt desire is to learn this much talked of method. Hundreds express themselves foolishly that if they could but learn to lay out a few fittings like a square to round or a transitional elbow, they could apply those principles to all the other things themselves. Wonderful things to be done with an untrained mind; but of course, they never do it.

Triangulation has so many applications of adjustment that it takes a very wide range of at least 50 or 60 problems to get any sort of a practical insight to it. Only technically trained men can learn something from one or two examples, since they have the power of visualization and can devise ways and means to make geometry serve their purpose. But men without even half a training cannot get much out of only a few problems.

Hence, tradesmen who would be 100 per cent efficient will find it necessary to learn a very comprehensive line of knowledge. To remain only one-third efficient only means one thing and that one-third is all you get out of it.

Our trade is being lifted more and more into the engineering trades high in public opinion. The way to be successful is to further develop yourself and then sell your services to the public who require special treatment. Right here we should mention that men who have spent much time learning something should spend a little more time touching up their weak places.

Although too many tradesmen stop just before the goal—simply because bought something short—something cheap—something old. Your trade today is worthy of as much expense in developing brains as it is in buying tools and machines to carry on the work. So that

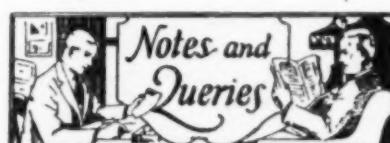
drafting is one part of your work, mathematics is another, and the mechanical should be the sum of all three; but owing to the specialization work—it's just the pulling end now.

Milcor Develops New Metal Rib Lath Clip

The Milwaukee Corrugating Company has applied for a patent on a new metal lath clip recently developed by the Milcor engineers. This clip is designed to secure Milcor stay-rib metal lath to flanged structural supporting and framing members such as I-beams.

The Milcor clip is made in two parts: a flat metal strap, and a strong U-shaped tie-wire. The metal strap is made of No. 16 gauge, 1-inch band iron and is hook-shaped at one end, being designed to slip over one flange of an I-beam or any other type of flanged supporting member. The other end of the strap is straight and remains so until the clip is placed in position; then this end is hammered or clinched around the opposite flange of the beams. This makes the strap adjustable to any size of flanged metal lumber.

The U-shaped tie-wire is made of No. 12 gauge steel wire, and when the clip is assembled, the two legs project up $2\frac{1}{2}$ inches, at right angles, through holes punched in the strap for this purpose. When the lath is applied the two legs of the tie-wire extend up through the lath, straddling the rib, and are clinched or twisted tightly on the upper side; thus they hold the lath securely.

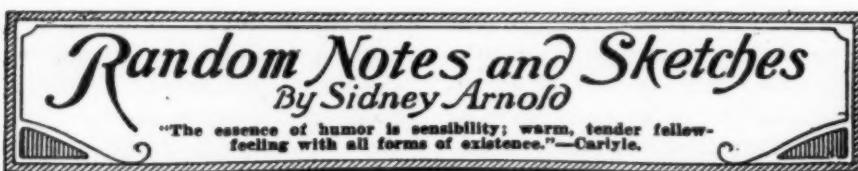


Carews Cutting Nippers.

From Hero Furnace Company, Sycamore Illinois.

Kindly advise us who manufactures Carews Patent Cutting Nippers.

Ans.—M. W. Robinson Company, 28 Warren Street, New York City.



You know Carl Johnson of the Charles Johnson Company, Peoria, Illinois, has the pride in ownership trait of the human species to a very high degree. Anything that he owns, from his private dwelling down to the most inexpensive stick-pin, gives him the thrill of ownership at sight. Carl was at the Urbana meeting of the National Warm Air Heating and Ventilating Association the fore part of this week. But when I saw him I thought he had a rather dejected look, which, of course, is something very foreign to his nature. I learned the reason, however, which was this: While coming to Urbana from Peoria, Carl was driving his new car. He stopped at a gas station and as the "nigger" approached him to minister to his wants, he made the remark that Carl had a very fine car. Sure was a "peach of a boat," in the opinion of the colored gentleman. Carl agreed with him, and as he did so he felt that pride of ownership surging up into his breast. But his exaltation was very short-lived, however, for no sooner had he agreed with the darky than the ebony cuss made reply: "Yes, suh, boss, dat suh am some car. Drivin' it through for somebody?"

* * *

I had the pleasure of seeing my good friend Joe Worth of the Premier Warm Air Heater Company at Urbana and I hardly knew him.

Joe is traveling Wisconsin, you know, and oh, boy! he tells me he's working hard, but he sure is putting on weight.

But I know that Wisconsin air will do great things for a hustler like Joe.

* * *

My friend, Ed Stahler, of the G. & S. Stove & Furnace Company, got off this effusion one day recently while he was feeling clever:

Teacher asked her class if they could compose a rhyme using the

word "Nellie." Johnny Jones, being called upon, arose much embarrassed.

"There was a pretty little girl named Nellie,

Who fell in the water and wet her little feet."

"Why, Johnnie, that don't rhyme."

"I know it doesn't. The water wasn't deep enough."

* * *

I certainly was happy to learn of the promotion of Les R. Taylor to General Sales Manager of the Inter-



T. Reid Mackin

national Heater Company. My only regret about the matter is that he will make Utica, New York, his headquarters, and I shall have to console myself with the thought that what is Chicago's loss is Utica's gain. I wish that the golf trio, Les Taylor, Art Lamneck and Jack Stowell, had been able to play off that match before Les got away. But perhaps they will get around to it yet.

Anyway, I also want to say a word about the successor of Mr. McCabe as Manager of the Chicago

office of International, T. Reid Mackin. Mr. Mackin, too, is deserving of the promotion he has received. He has worked hard, not only for the International Heater Company, but for the warm air heating industry as a whole, and the recognition of his merit by his superior officers is well merited.

* * *

A little bird whispered to me the other day at Urbana that my friend William C. Grolbert, the go-getting warm air heating contractor of East Akron, Ohio, was elected a director of that city's Chamber of Commerce.

Good luck, Bill; you're in big company sitting with those big tire and tube fellows but you will be a big fellow, too, and in more ways than one, what I mean.

We know that East Akron will learn more about warm air heating now, as Bill is a regular visitor to Urbana and he knows his stuff.

* * *

My friend, Gus Pfeffer, Johnstown, Pennsylvania, wanted to be beforehand on this Christmas greeting idea, so he sends the following:

When eggs were 3 dozen for 25c; butter 10c per pound; milk was 5c a quart; the butcher gave away liver and treated the kids with bologna; the hird girl received two dollars a week and did the washin'.

No one was ever operated on for appendicitis or bought monkey glands. Microbes were unheard of; folks lived to a good old age and every year walked miles to wish their friends a Merry Christmas.

Everybody rides in automobiles, or flies; plays golf; shoots crap; plays the piano with their feet; goes to the movies nightly; smokes cigarettes; drinks Rockus Juice; blames the H. C. of L. on the Republicans; never go to bed the same day they get up, and think they are having a wonderful time.

These are days of suffragetting, profiteering, excess taxes and prohibition, and if you think life is worth living, we wish you a Happy New Year!

Thank you, Gus. Your sentiment is appreciated.

Gas-Fired Warm Air Furnace Costs 15 PER CENT LESS to Operate Than Steam

Western Warm Air Furnace & Supply Association Holds 9th Annual Meeting

By GEORGE J. DUERR

THE Ninth Annual Convention of the Western Warm Air Furnace and Supply Association was held in the Sherman Hotel, Chicago, Friday and Saturday, December 2 and 3, 1927, with about fifty members in attendance.

The meeting was called to order by President J. Harvey Manny. In the absence of Acting Secretary Mrs. John H. Hussie, R. W. Blanchard was called upon to perform the duties of the Secretary.

President Manny, in his annual message to the members of the association, called attention to the fact that public sentiment is changing in favor of warm air, due to the efforts which the various warm air heating associations are making to improve the product and the service which goes with it. He placed a great deal of stress upon the servicing angle of the warm air heating business. He cited what the plumbers are doing as a good example of what could be done by the warm air heating men. He also asked that due reverence be paid to the memory of the late Secretary John H. Hussie.

Treasurer John B. Fehlig reported that the association was in a very good financial condition. There are no delinquents, although two members have resigned. Mr. Fehlig also reported upon the recognition the association had received from the Peoria Chamber of Commerce, stating that a great deal of the expense of holding the convention at Peoria last spring had been borne by the Chamber of Commerce.

Ruark Advocates Industrial Coöperation

"What Your Association Means to You," was the title of an address by B. W. Ruark, Assistant Commissioner, Department of Administration Automotive Equipment As-

sociation. In his address Mr. Ruark endeavored to give the members of the Western Warm Air Furnace & Supply Association a new slant on the absolute necessity of coöperative work. "Present-day activities do not permit of anything but organized coöperation," said he. By way of illustrating his point, Mr. Ruark made the rather startling statement that only 40 per cent of the factors in business are directly under the



B. H. Andrew, a Visitor from New Zealand.

control of the men who are actively engaged in that business, the remaining 60 per cent of those factors being out of their control entirely.

In the automotive accessory business alone such a trivial appearing thing as the nuisance tax of the national government takes \$90,000,000 annually. In trying to knock this tax off during the present session of Congress, the automotive industries are going to present a solid front.

The credit facilities that have been obtained is another example of what coöperation has done for the automotive accessory business.

Freight rates and the auditing of freight bills is one place where the association has shown its real power to be of service. Many hundreds of dollars annually are returned to shippers because errors in freight bills are discovered and corrected.

Greater Market Development an Important Association Work

One of the biggest sources of benefit to the members of the association is had in the greater market development activities of the association. The activities of the organization in the direction of market development have reached a point where a member can get almost any information desired on market conditions in any part of the country. These instances were all cited by Mr. Ruark to show what can be done by an association if it is gone about in the correct manner.

One fact which Mr. Ruark tried to impress very forcibly upon his audience was that the ultimate man in the chain of distribution must carry the manufacturers' message to the public. Therefore, it is to the interests of the manufacturer to develop his dealer outlets. It was Mr. Ruark's opinion that the dealer outlets of the furnace business are at the present time mechanical rather than merchandisers, and this problem of developing these men to be merchandisers is too big a problem for the individual manufacturer to handle alone. It must be done, if at all, by some organized body. Above all things, the association must be a business organization, run in a business way by business men. It must show a profit on the money invested.

"The automotive accessory industry has faced the identical problems with which the furnace manufacturers are now faced," said Mr.

December 10, 1927

Ruark—that of getting the dealer to ask his customers to buy. He spoke of a trip which the president of the A. C. Spark Plug Company had made, starting from Maine with a car from which all of the ordinary accessories had been removed and going through towns all the way to the Pacific coast. Out of the thousands of dealers that he had talked to only three had asked him to buy anything, although, as far as the dealers were concerned or knew, he was a prospect for motor accessories. And still these same dealers would set up a loud clamor about business going to the dogs.

Follow-Up Important in Direct Mail Campaigns

In connection with the statement about making merchandisers of the dealers, Mr. Ruark said that in his line of work they had taken the matter to a point where a crew of men would go out and actually wash the windows of the dealer and rearrange his store for him. Mr. Ruark receiving a rising vote of thanks for his splendid address.

Mr. Harms remarked, after Mr. Ruark had finished, that he had thought he knew something about association work, but that Mr. Ruark had taught him something which he would not soon forget.

"Direct Mail Advertising as Applied to Warm Air Furnace Needs" was the subject of the address by Homer J. Buckley, President, Buckley-Dement Company, who followed Mr. Ruark. Mr. Buckley opened his address with the statement that 80 per cent of the direct-by-mail business solicitation is wasted because it is wrongly conceived and wrongly directed. The reason for this is that of the 250,000 manufacturing concerns in the United States today less than 10 per cent have regular advertising men. This means that whatever advertising is done by these companies, whether direct mail or otherwise, is necessarily supervised by the regular executives of the company who are primarily engaged with matters of production and sales. To these men falls the lot of planning whatever advertising is engaged in, and writing the copy

for it. The result can be nothing but a spasmodic effort which might, if the truth were really told, never have been begun.

"In the well-organized direct mail advertising campaign," said Mr. Buckley, "the principles to follow up must be thoroughly understood." Here Mr. Buckley presented some exceedingly interesting statistics.

"In view of the fact," said Mr. Buckley, "that a letter is the next thing to a personal call, the same reasoning will apply to the letter as applies in the case of a personal call. The statistics which he presented showed that out of a group of washing machine salesmen representing 100 per cent, 30 per cent made only one call on a dealer. Another 25 per cent made only two calls, 20 per cent made three calls, 17 per cent made four calls, and only 8 per cent made five calls on the same dealer. This fact is significant that 80 per cent of the orders that were taken among the dealers called upon were taken by those salesmen who had made five or more calls, showing not only that the man who makes the most calls gets the business, but also showing that it is practically impossible to get business with any less than five calls.

How to Compile a Mailing List Told

"Another factor which is important," said Mr. Buckley, "is to know how to compile a mailing list that will reduce the 'duds' to an absolute minimum. The only proper way for the heating man to do this would be to take a census of the homes in his town. As a suggestion he might send a young woman around to the houses with a card upon which would be printed several questions regarding the kind of heating system that is now in use, how long it had been in use, whether or not it is giving satisfaction. After these names have been collected they could be sorted out, putting all of the steam plants in one file, all of the warm air furnaces in another file, and so on, the object being to create a mailing list that would enable the direct by mail department of the business to plan an intelligent cam-

paign. Thus the waste is eliminated and better results will accrue."

The benefits of the direct-by-mail system to the dealer over newspaper advertising were enumerated as follows:

1. The list is classified and therefore concentrated.
2. It is possible to capitalize on timeliness.
3. It is only one step less than a personal call. The writer can put his own personality into the letters.
4. Direct mail has the floor.
5. Results can be checked.
6. Demands instant actions.
7. Gives advertiser control.
8. The message is secret and individual.

One idea which Mr. Buckley impressed upon the minds of his audience was that their aids to their dealers were based entirely upon the manufacturer himself. They were all designed to put the manufacturer over in the community and not the dealer himself. In other words, there is too much I, I, Me, Me, We, We in the literature and not enough attention paid toward pushing the dealer. Consequently the dealers who receive this material feel resentful about it and refuse to use it. The literature should play up the dealer more and should be typical of the community in which it is to be used.

He illustrated his meaning here by relating how a clothing manufacturer, wishing to know why one of his dealers in a farming community was not using the sales literature that was being sent to him, wrote to him with this in mind. The answer he got was very definite. The dealer wrote that if the manufacturer would cease sending him material on collegiate clothing and give him some sales helps that were more representative of the dealer's farming trade, he would be glad to use it. But if he attempted to use the material that was being sent to him, he would in all probability be shot at sunrise.

Another criticism Mr. Buckley offered the manufacturers was they did not have the proper attitude toward an inquiry. He was inclined

to think that they treated inquiries rather shabbily as a whole. When, as a matter of fact, many companies who are on their toes will pay as high as \$100 for one inquiry, depending upon the nature of the product and sale involved, the average inquiry for the warm air furnace dealer should not cost more than in the neighborhood of five cents apiece.

Warm air furnace manufacturers will be compelled to create a public consciousness in the minds of the public before their business will grow very materially. Mr. Buckley said that he as a customer for warm air heating, having built himself a new house recently, had not once been solicited by a warm air heating man, either manufacturer or installer, despite the fact that he was building a new house had been made known to the trade through the regular channels. Mr. Buckley was given a rising vote of thanks for his address.

Afternoon Session Technical in Nature

In the afternoon the first speaker was E. W. Petersen, Chicago Branch of the American Blower Company, whose address appears in full on another page of this issue. Turn to page 83, please.

Several questions were asked Mr. Petersen when he had finished his address. One of these was, "How do the costs of the propeller and centrifugal type of fans compare?" To this Mr. Petersen replied that the propeller type of fan is cheaper in operating cost with free delivery only. Otherwise the cost is the same. "It is an erroneous idea," said Mr. Petersen, "that a propeller fan is much cheaper in operation than a blower."

Another question asked was, "Which is best, the propeller or centrifugal fan for intermittent operation?" To this Mr. Petersen replied that he does not advocate the use of a propeller fan for any duct system.

"In what way will a blower improve a Standard Code job installed in a 7-room house?" was another

question asked. The reply was to the effect that it would save fuel and overcome winds. Mr. Petersen was given a rising vote of thanks for his splendid address.

Gas-Fired Warm Air 15% Cheaper to Operate Than Steam

Mr. Petersen was followed by H. B. Johns of the People's Gas Company, Chicago. Mr. Johns spoke of the increasing popularity of the gas-fired warm air furnace, stating that there are now installed in the city of Chicago some 2,000 gas-fired warm air furnaces. These installations have been made for the most part by Chicago warm air furnace installers and are made so that the customer can have the use of the basement.

"In order to be successful," said Mr. Johns, in speaking of the construction of the gas-fired furnace, "the furnace must be so constructed as to allow the heat to be wiped; in other words, the furnace must have a comparatively large radiating surface and must be at least 70 per cent efficient. The furnace should be safe and preferably automatically controlled."

In regard to the cost of heating a home with a gas-fired furnace, Mr. Johns said it averaged about \$40 per room per season, figuring the cost on a basis of 100 B. t. u. per square inch for the first floor, 166 B. t. u. per square inch for the second floor, and 200 B. t. u. per square inch for the third floor.

One exceedingly interesting statement made by Mr. Johns in relation to the cost of heating with gas was this, that heating a home with a gas-fired warm air furnace is about 15 per cent less than it is when the same home is heated with steam or hot water. Another fact was that about 15 per cent is added to the heating bill of the home owner if he requires that his home be heated to 75 degrees instead of 70 degrees.

Going back to the construction of the warm air furnace requirements when fired with gas, Mr. Johns stated that, in view of the fact that when gas is burned one of the products of combustion is water, pro-

vision must be made for the disposal of this water. This condensation is considerable. About four and one-half pounds or two quarts of water are condensed from each 100 feet of gas burned when the efficiency of the furnace is high.

Another product of combustion of gas is sulphur, and this must also be disposed of. The ordinary gas has about five grains of sulphur per cubic foot. This sulphur is changed into sulphur dioxide and later to trioxide, which is the next thing to sulphuric acid. Sulphuric acid, being an exceedingly active agent, causes havoc with the smoke flues. Tests have proved that the ordinary galvanized iron flue will not last more than two or three years. The company is now using aluminum, terne plate and cast iron with good results.

"There are," said Mr. Johns, "installed in the United States today approximately 118,000 gas-fired units. About 30 per cent of these are in warm air furnaces. During the last year there have been about 10,000 installations made. In 1926 there were 71 companies reporting the sale of gas house-heating appliances. In 1927 this number had increased to 156, showing that a great interest is being taken in that phase of heating."

In the opinion of Mr. Johns, appearance and simplicity are the factors which should receive the greatest consideration when attempting to market the gas-fired warm air heating system. Mr. Johns also received a rising vote of thanks for his address.

The executive session was held after the regular meeting on Friday. The banquet was held in the evening.

All the boys were on deck for the banquet and a finer spread would be hard to imagine.

Between courses Ros Strong and Dave Farquhar led the community singing and introduced and induced special request numbers by some of the boys.

After coffee and cigars, Harvey and Ralph brought on their entertainment and the boys enjoyed the

songs and music of several comedians.

Tom Pearson did a turn at story telling and we all heard a few new ones.

During the evening, B. H. Andrew of Auckland, New Zealand, came in and Harvey, having heard Mr. Andrew tell some stories at the Urbana banquet, requested Mr. Andrew to say a few words to the boys. Mr. Andrew, however, caught the spirit of the evening, and instead of arising to speak, he made for the exit, and after a few seconds in which he disarranged his necktie and his hair and rebuttoned his vest the wrong way, he staggered in with his hands in his pocket. This was a surprise indeed and he got his laughs right off the bat. Mr. Andrew gave a dialogue in the style of a New Zealander slightly under the weather and it went over big.

The election of officers resulted as follows: President, J. Harvey Manny, re-elected; Vice-President, Harry G. Masten, Des Moines; Secretary, E. C. Carter, Chicago; Treasurer, John B. Fehlig, Kansas City, Missouri.

The Directors appointed were Herb W. Symonds, St. Louis; D. E. Cummings, Chicago; E. W. Nesbit, Omaha.

American Society of Heating and Ventilating Engineers to Meet January 23 to 26 at New York City

A program packed full of both business and recreation is assured for the members and guests of the American Society of Heating and Ventilating Engineers when they gather at the Hotel Pennsylvania in New York City for the society's 34th annual meeting, January 23 to 26. The members of the New York Chapter, hosts at the meeting, have planned an extensive program that should appeal to every taste. Special arrangements have been made with the Hotel Pennsylvania to care for all members of the society arriving at the hotel on Monday, January 23, registration facilities being provided at the lounge in the east end of the lobby. Registrations for

the convention proper will be in the southeast ballroom, where the past presidents of the society, under the leadership of W. H. Driscoll, will act as a reception committee and assist the committee on arrangements in caring for the arriving guests.

The first morning of the convention will be given over entirely to registration and meetings of the Council and other committees, the technical features beginning at 1:30 p. m. Monday afternoon, when President F. Paul Anderson will open the meeting. Technical papers will follow the report of the tellers on the election of officers, and it is hoped to have one or more committee reports.

One session this year is to be devoted to a discussion of factory heating and ventilation, a new departure. Another session is to take up the various codes now pending before the society, including those on heating and ventilating garages, testing building insulation and air cleaning devices.

Ample time will be given to the committee on research to tell of the progress of this work. It is also planned to hear from the committee appointed at the White Sulphur Springs meeting whose duty was to recommend a procedure in the coordination of existing facilities and data from all research laboratory investigations, and to study the use of central agency to make these data available to those who are interested or who contemplate further research in the heating and ventilating fields.

Entertainment will include a tea dance from 3:30 to 5:30 Monday afternoon, the past presidents' dinner on Monday evening, a theater party for the ladies on Wednesday afternoon, and the banquet and dance, which will be held on Tuesday evening. One of the featured speakers will be A. O. Stanley.

The society's application has been granted for the certificate plan of reduced fare (one and a half fare) and every member is urged to ask for his certificate when buying his ticket, as it is possible to get half

fare on the return only if 250 or more certificates are presented and validated in New York.

Applying a True Measure of Service To Industry and Products

The public, including its counselors and executives, such as its architects, engineers and builders, as well as owners, renters and speculators, needs to understand that yours is a rational art requiring mental effort, accumulated knowledge and judgment ripened by experience. That in buying your service they buy brains and character as well as skill and proper material.

And that these things can only be furnished henceforth upon fair terms of barter, your efforts in their behalf in return for such compensation as will, when all proper economies are availed of, give you the same plane of living as other men of your intelligence, courage and skill for the same risks taken. That the true measure of service or work is not first cost, but total cost per year of service.

And that initial and enduring quality of appearance through its advertising effect for them is one of the highly important qualities. Theirs must remain the right to name the years of service for which your work is to endure before renewal, but the time is now coming when every building will be designed and proportioned for a definite life in years and the determination of the materials and grades of workmanship which shall be used will be based upon the cost per year of satisfactory service for this predetermined term of years.

This new consideration is already on the way among the largest architects and is on the way to becoming a financing requirement where the more active commercial buildings are concerned. It will come to all of your flock who do not know, as a lesson to be learned, a hardship—and afterwards, like all knowledge, as a source of new strength and defense against the uninitiated who do not know.

How Do Propeller and Centrifugal Fans *PERFORM* in Given Duties?

How Is Proper SELECTION of Fan Made for a Given Duty in Warm Air Heating?

By E. W. PETERSEN*

I APPRECIATE the privilege of talking to you men today, especially since I realize that you have a great deal of business to transact in a comparatively short time. You want facts and figures in concrete form, so with your kind indulgence I will read this paper and thus avoid rambling.

The purpose of this talk is merely to acquaint you with the manner in which various types of fans perform in given duties. No doubt, to a lot of you the operating characteristics of fans are well known, but I trust you will bear with me, so that we may review the facts together.

A few years ago it would have seemed ridiculous to have allotted valuable convention time to a discussion of fans, since few were installed in connection with warm air furnaces. However, it is becoming common practice to install fans on warm air furnaces, not merely on blast heating systems, such as are used in garages, factories, churches and large auditoriums, but on heating systems in private residences, where the fan is really a booster. On the latter type of installation the job can operate as a gravity system when the fan is shut off.

Installing a fan properly on such a job insures that your customer will be satisfied—and it is cheap insurance. After you have installed a few, you will feel something like the small school boy when his teacher said, "Johnny, how much is two times two?" Johnny replied, "Two times two are four." His teacher

patted him on the shoulder and said, "That is very good, Johnny." Johnny looked up and said, "Very good, hell! That's perfect."

Why Necessary to Have More Than One Type Fan?

There are a number of factors governing the proper selection of fans to be used in connection with a warm air furnace job. At first it seems a bit confusing to know what type to use. Is it necessary to have more than one type, and why?

Trying to solve all problems in one way reminds me of a story I recently read in *Forbes*. A mysterious building had been erected on the outskirts of a small town. It was shrouded in mystery. All that was known about it was that it was a chemical laboratory. An old farmer driving past the place after work stopped and, seeing a man in the doorway, called to him: "What be ye doin' in this here place?"

"We are searching for a Universal solvent—something that will dissolve all things," said the chemist.

"What good will that be?"

"Imagine, sir—it will dissolve all things. If we want a solution of iron, glass, gold, anything, all that we have to do is to drop it in this solution."

"Fine," said the farmer. "Fine! What be ye going to keep it in?"

The factors determining the size and type of fan to use are:

1—Cubic feet of air to be handled per minute.

2—Static pressure against which the fan must operate.

3—Quietness in operation.

Two Types of Fans Generally In Use Are Propeller and Centrifugal

The two types of fans most generally used are the propeller types

and the centrifugal. In the propeller type of fan the air enters the wheel on one side and blows out the other side in the same general direction. This fan works on the displacement principle.

The propelling force of a propeller fan is greatest at the periphery of the wheel and gradually decreases toward the center of the wheel. At the center there is no propelling force, therefore, if a propeller fan is used in a duct where it must overcome resistance, the air will be forced forward at the outer part of the wheel and will have a tendency to recirculate through the center of the wheel, since at this point there is no outward propelling force. Thus the air will recirculate in a short section of duct, but the fan will not do the work for which it was intended. This tendency can be partly overcome by placing a disc of proper proportions over that central part of the wheel, where the propelling force is the least. If a propeller fan is used in a duct, it should blow out into a straight pipe of length equal to five diameters of the fan before the pipe bends to some other direction—if at all possible—otherwise delivery of air will be materially affected.

The power required to drive a propeller fan at a given speed increases as the pressure against which the fan is operating increases, that is, a 16-inch propeller fan running at 1,150 r.p.m. requires more power to drive it when operating against $\frac{1}{4}$ -inch static pressure than it does against $\frac{1}{8}$ -inch static pressure, but the air it handles at $\frac{1}{4}$ -inch is much less than at $\frac{1}{8}$ -inch. For these reasons a propeller fan is not as well adapted for operation in a duct system as the second type of fan known as a centrifugal fan.

*Address on the characteristics of the propeller type and centrifugal fans and the possible adaptability of each to the warm air heating system, by E. W. Petersen, Chicago office American Blower Company, delivered at the convention of the Western Warm Air Furnace and Supply Association, Sherman House, Chicago, December 2, 1927.

Why Centrifugal Is Called Squirrel Cage

The first centrifugal fans were of the paddle wheel type. Later, Mr. Davidson invented the Sirocco multiblade centrifugal fan, which is much more efficient than the paddle wheel fan at pressures generally en-

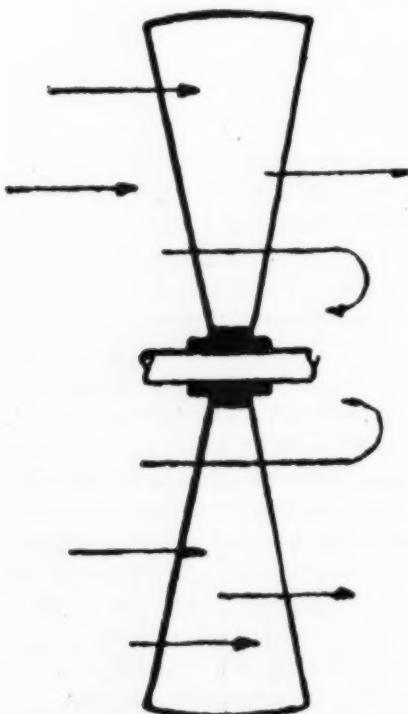


Figure 4—Back Flow of Air at Center in Fan Without Disc

countered in heating, ventilating and air conditioning work. This type has a wheel, which looks somewhat like a squirrel cage, has 64 curved blades around its outer circumference.

The centrifugal fan has exactly the opposite characteristics of a propeller fan. When running at a given speed the power required to drive the blower will decrease as the pressure increases. For example, a centrifugal fan having a 24-inch diameter wheel running at 450 r.p.m. requires less power to drive it when operating against $\frac{1}{2}$ -inch static pressure than it does against $\frac{1}{4}$ -inch static pressure. Of course, it handles less air at the higher pressure, but the volume does not decrease in as great a proportion as does the air handled by a propeller type of fan.

The following data was taken from our (American Blower Company) capacity tables to show you in

actual figures just what this means. The speeds were taken so as to keep them as clearly constant as possible:

18 $\frac{3}{4}$ -Inch Propeller Fan

S.P.	C.F.M.	R.P.M.	T.S.	B.H.P.
$\frac{1}{4}$ "	2,132	1,150	....	.2265
$\frac{3}{8}$ "	1,492	1,142	....	.276
$\frac{1}{2}$ "	1,065	1,177	....	.373

12-Inch Propeller Fan

S.P.	C.F.M.	R.P.M.	T.S.	B.H.P.
$\frac{1}{16}$ "	765	1,156	3,785	.0236
$\frac{1}{8}$ "	669	1,200	3,927	.0346
$\frac{1}{4}$ "	287	1,220	3,990	.0564

In order to handle the same volume 765 c.f.m. at $\frac{1}{4}$ -inch that it handles at $\frac{1}{16}$ -inch, this 12-inch fan must run at 1,558 r.p.m. The tip speed would be 5,103 feet per minute. This fan would be very noisy, as I shall demonstrate later. A centrifugal fan with a 9-inch wheel would handle 745 c.f.m. against $\frac{1}{4}$ -inch static pressure when running 1,190 r.p.m., and the tip speed is only 2,800 feet per minute.

Quietness of Operation Also a Factor to Consider

So far we have discussed both types without calling much attention to quietness of operation. The peripheral velocity of a propeller type of fan should not exceed 4,000 feet per minute for quiet operation. Here is some interesting data regarding noise of propeller fans:

Peripheral velocity, which is wheel circumference multiplied by r.p.m.:

8,000 per minute	—very noisy.
7,000 per minute	—noisy.
6,000 per minute	—quite noisy.
5,500 per minute	—little noisy.
5,000 per minute	—humming.
4,500 per minute	—slight humming.
4,000 per minute	—quiet.

In gathering this data the fans were operated free delivery. It should be borne in mind that when the fan is operating in a duct, slight noises will be telegraphed through the duct and magnified. Therefore, this table should be used with care in choosing a propeller fan for operation in a duct. To be safe, lower peripheral velocities should be used than the minimum shown, unless quiet operation is not essential.

Considering this data, a 12-inch propeller fan should not be operated over 1,150 r.p.m., since above this

Centrifugal Fan with 15-Inch Wheel

S.P.	C.F.M.	R.P.M.	T.S.	B.H.P.
$\frac{1}{4}$ "	2,108	527	....	.32
$\frac{3}{8}$ "	1,736	520	....	.20
$\frac{1}{2}$ "	1,240	521	....	.17

Centrifugal Fan with 9-Inch Wheel	S.P.	C.F.M.	R.P.M.	T.S.	B.H.P.
...
$\frac{1}{4}$ "	745	1,190	2,800	....	213

speed it will be noisy. A 16-inch fan cannot exceed 1,000 r.p.m. without being noisy and at this speed its capacity is only 786 c.f.m. against $\frac{1}{4}$ -inch static pressure. Therefore, quietness in operation is another thing to watch when selecting a propeller fan for operation in a duct system. Propeller fans are designed primarily for operation against free

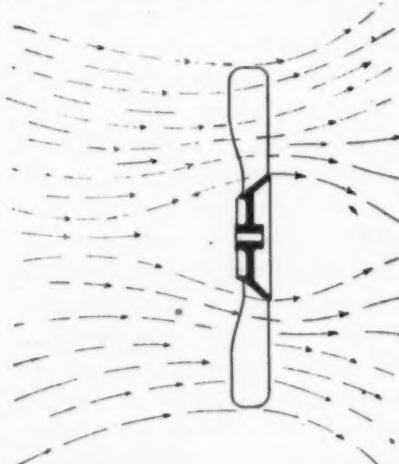


Figure 5—Course of Air Through Ventura Fan with Wide Center Disc

delivery. Our standard propeller fans are not suitable for operation in any duct system. However, it is possible to obtain them with high-powered motors suitable for handling air up to .2-inch static pressure.

In selecting a centrifugal fan for quiet operation, the tip speed should not exceed 3,200 feet per minute. This, of course, depends upon the static pressure against which the fan will operate. For low pressures select lower tip speeds and correspondingly lower outlet velocities.

In closing allow me to say that it is not my intention to get you con-

fused by using too many don'ts. However, if you know just what to expect from a propeller fan or a centrifugal fan on a warm air furnace installation, all of your work of this nature will be highly profitable.

If you understand the operating characteristics of both types of fans you need do no experimenting.

A fan installed on a job will operate according to the same laws it follows in the research laboratory. Don't try to make it perform differently, because it can't be done.

Old Product in New Form Wins Instant Approval and Profits for Dealers

The presentation of an old and favorably known product in a new dress often strikes a note of popular appeal which wins an instant and general response from the buying public. This has been demonstrated by the Richardson & Boynton Company, for eighty years manufacturers of heating plants and equipment for the home, and for commercial and industrial structures.

Responding to a general trend in the demand for bright and attractive colors in the basement, the Richardson & Boynton Company have introduced their time-tried product in a new form which satisfies the modern demand for color, and which plays an important part in the transformation of the basement into a livable and attractive part of the house.

Richardson & Boynton warm air heating plants are now produced in a square case, in a permanent Duco enamel of pleasing blue. This square metal casing is packed with asbestos, effecting a radical conservation of heat, with corresponding economy of operation.

The distributor is not called upon to test or experiment with Richardson & Boynton square-cased heating plants, as the principles of rating for the new form remain the same as in the old.

The salability of Richardson & Boynton products is increased tremendously by reason of the adoption of the new form, because of its

cleanliness and its harmony with basement color schemes, with today are an important part of every modern home.

Health—a Community Asset

The importance of health as an element of primary importance in a community's prosperity is emphasized in a bulletin issued by the Insurance Department of the Chamber of Commerce of the United States.

An annual saving of at least \$1,200,000,000, the department points out, has been effected by the reduction of the tuberculosis death rate since 1900.

General Gorgas' sanitary program, a part of the project for the construction of the Panama Canal, saved the United States Government, it is said, \$80,000,000.

The advantage of proper sanitary conditions is of no less importance, from an economic viewpoint, to every community.

"The ability of a man to work," the bulletin continues, "depends in large measure upon his health. Whatever reduces his earning capacity in any way reduces the assets of the community. Any decrease in earning power is naturally reflected in reduced purchasing power, with the result that every case of illness or premature death involving a loss of wages has an effect upon the community. This may not be noticeable in individual cases, but the total sum is tremendous. According to an eminent statistician, the average workman loses seven days a year due to sickness, a loss of about 2 per cent of his earning capacity. This amounts in the aggregate to at least \$2,000,000,000 for the entire country. Premature death accounts for an even larger loss, conservatively estimated by the same authority to be \$6,000,000,000 annually."



Kentucky Hardware & Implement Association, Seelbach Hotel, Louisville, Kentucky, January 17 to 20, 1927.

Secretary-treasurer, J. M. Stone, 200 Republic Building, Louisville, Kentucky.

Sheet Metal Contractors' Association of Indiana, January 24, 25 and 26, 1928, at Indianapolis, Indiana. Executive secretary, Paul R. Jordan, 631 South Delaware Street, Indianapolis.

Missouri Retail Hardware Association, the Hotel Statler, St. Louis, January 23-25. F. X. Becherer, secretary, 5106 North Broadway, St. Louis.

Nebraska Retail Hardware Association, Omaha, January 31 to February 3. George H. Dietz, secretary, 414-19 Little Building, Lincoln.

Indiana Retail Hardware Association, Indianapolis, January 31 to February 3. The Claypool Hotel will be convention headquarters and meeting place. G. F. Sheely, secretary, 911 Meyer-Kiser Bank Building, Indianapolis.

Michigan Retail Hardware Association, Detroit, February 7-10. The Statler Hotel will be headquarters. A. J. Scott, secretary, Marine City.

Wisconsin Retail Hardware Association, Auditorium, Milwaukee, February 7-10. P. J. Jacobs, secretary, Stevens Point.

Iowa Retail Hardware Association, Des Moines, February 14-17. A. R. Sale, secretary, Mason City.

Pennsylvania and Atlantic Seaboard Hardware Association, Philadelphia Commercial Museum, February 14-17. Sharon E. Jones, secretary, Wesley Building, Philadelphia.

Minnesota Retail Hardware Association, New Municipal Auditorium, Minneapolis, February 21-24. C. H. Casey, manager, Nicollet at 24th Street, Minneapolis.

Ohio Hardware Association will hold its 1928 convention and exhibit at Toledo, February 21-24. James B. Carson, secretary, 411 Mutual Home Building, Dayton.

South Dakota Retail Hardware Association, Coliseum Building, in Sioux Falls, February 27 and 28 and March 1. Charles H. Casey, secretary, Nicollet at 24th Street, Minneapolis.

Illinois Retail Hardware Association, February 14, 15 and 16, at the Sherman Hotel, Chicago. Leon D. Nish, secretary, 14-16 North Spring Street, Elgin.

Arkansas Retail Hardware Association, Little Rock, during the month of May, exact dates for the meeting to be determined later. L. P. Biggs, secretary, 815-16 Southern Trust Building, Little Rock.

Michigan Sheet Metal & Roofing Contractors' Association, Kalamazoo, Michigan, March 5, 6, 7, 8, 1928. Secretary, Frank E. Ederle, 1121 Franklin Street, Grand Rapids, Michigan.

National Association of Sheet Metal Contractors of the United States, Hotel Statler, Cleveland, Ohio, May 22nd to 25th, 1928. Secretary, W. C. Markle, 336 Fourth Avenue, Pittsburgh, Pennsylvania.

National Association of Sheet Metal Contractors of the United States, the Ohio Sheet Metal Contractors' Association, joint convention, Hotel Statler, Cleveland, Ohio, May 22, 23, 24 and 25, 1928. J. M. Saunders, 215 Plymouth Building, Cleveland, Ohio, convention chairman.

Steel Sales Grow But Consumption is Low—Coming Quarter Looks Promising

Nonferrous Metal Prices Are Stronger—Pig Iron Sales Good

STEEL buyers as well as producers see increasing promise in the coming quarter, and determination of first quarter prices is a stimulus to sales.

The market, however, retains its two-sided nature. Order books are lengthening, almost exclusively for first quarter and first half delivery. Consumption, in the meantime, remains low and users are sharply restricting receipts in view of approaching inventory-taking. This condition is reflected in steel ingot production, which in November declined to the lowest point in 28 months, and December thus far shows little change.

Producers of plates, shapes and bars are booking first quarter business on the basis of 1.80 cents, Pittsburgh, and 1.90 cents, Chicago. Current shipments almost entirely are invoiced at prices governing before the mid-November advance.

Pig Iron

The feature of the pig iron market at Pittsburgh is an inquiry from one concern involving up to 12,000 tons of bessemer iron for its Warren, Ohio, plant, the largest inquiry for bessemer issued in a long time. This company also wants a large tonnage of gray forge iron for its Pittsburgh and Girard plants.

It is understood contracts will be closed today. On bessemer iron \$17.50 and \$17.75 were developed, although some interests claim they will not quote less than \$18. The latter figure was applied to single carload sales this week.

Basic deals have been covered quietly, and the nominal price still is \$17, valley. A few interests have booked some first quarter foundry iron at \$17.50, base, valley, restoring full silicon differentials. Some small lots, all under 100 tons, of low phosphorus iron were sold at \$27, valley.

The average price of basic iron in November was \$17, the same as in October. The average for bessemer in November was \$17.875, compared with \$18 in October.

At Chicago spot buying of pig iron to tide users over December is more active. Some sellers report considerable activity in one and several carload orders. Additional buyers are placing contracts quietly for first quarter. Some estimates are that one-third of first quarter tonnage has been placed.

The last of the season's boat iron has been sold and the base price of foundry iron, \$18.50, appears firm, with outside iron not now competing. Bookings for first quarter have been at the current price.

At Birmingham pig iron is being booked in small quantities for first quarter. The only price that is mentioned, however, is \$16, base, Birmingham, which furnace interests have said applies only to the small lots for December delivery.

Copper

Copper sold at 13.87½ cents and then at 14 cents, Connecticut, and ½ to ¼ cent more in the Midwest, compared with 13.75 cents in the last week of November. The export price meanwhile has gone from 14.05 cents to 14.35 cents c.i.f. European ports.

Not a great deal of metal has been sold for February in the domestic market, but a fair amount has been sold for export. The latter usually is bought a little farther ahead than domestic metal. November export sales were of record size and good buying has continued this month.

Tin

The tin market has been strong, but prices have not changed much in the past week, being mostly around 59 cents. The spread be-

tween spot and futures has been unusually narrow, with interest mostly in the latter.

Users have bought freely for first quarter and some later business has been done, but it is mostly speculative. November statistics showed a cut in stocks here on account of light arrivals, despite light deliveries. However, world statistics turned out strong, even with large shipments from the Far East, as deliveries in Europe were large.

Zinc

Prime western zinc lost a few points of its recent recovery, but at 5.82½ cents, East St. Louis, the last of the distress metal disappeared and the market returned to 5.90 cents. Buying has been light and there has not been much feature to the market. The ore market is steady.

Lead

Lead is as strong as at any time since the upward turn. Good orders in the eastern market continue to be received, but whereas previously supplies were being allotted sparingly, greater freedom in booking is evident.

Solder

Chicago warehouse prices on solder are as follows: Warranted 50-50, \$36.50; Commercial 45-55, \$33.50; plumbers', \$30.50; all per 100 pounds.

Old Metals

Wholesale quotations in the Chicago district, which should be considered as nominal, is as follows: Old steel axles, \$15.00 to \$15.50; old iron axles, \$19.00 to \$19.50; steel springs, \$14.00 to \$14.50; No. 1 wrought iron, \$10.25 to \$10.75; No. 1 cast, \$12.00 to \$12.50, all per net tons. Prices for non-ferrous metals are quoted as follows, per pound: Light copper, 9 cents; zinc, 3½ cents; cast aluminum, 13¾ cents.



Are you selling rust-fire* protection to industry?

WHERE can industrial concerns in your section purchase rust-fire protection? From you, if you use and recommend rust-resisting ARMCO Ingot Iron. Thousands of contractors are boosting profits by thus better serving the sheet metal needs of Industry.

ARMCO Ingot Iron will meet your industrial customer's most exacting requirements. For it is a dependable, economical safeguard against the ravages of rust-fire. And whether you apply it in the form of roofing, siding, guttering, machine casings or whatnot, it is sure to give a full measure of service. For this pure iron is made to last.

Then, too, the workable, time-and-labor-saving advantages of ARMCO Ingot Iron are not to be overlooked. It helps you finish time-limit jobs right on the dot. And when the job is done and you balance your books you'll find a worth-while savings in labor costs.



Ingot Iron

This trade mark is your assurance that products bearing it are made with the skill, intelligence, and fidelity long associated with the name "ARMCO" and hence can be depended upon to possess in the highest degree the merits claimed for them.

*Rust-Fire! The only difference between rusting and burning is time—both are oxidation. You can feel and see the fire produced by rapid burning. But when the metal rusts, the process is too slow to see. Rust is the "ash" of this fire.

The ARMCO Distributors Ass'n of America
Executive Offices, Middletown, Ohio

ARMCO INGOT IRON
The Purest Iron Made

Mention AMERICAN ARTISAN in your reply—Thank you!

Chicago Warehouse Metal and Furnace Supply Prices

AMERICAN ARTISAN is the only publication containing Western Metal, Furnace Supply and Hardware prices corrected weekly.

METALS

PIG IRON

Chicago Fdy.

No. 2.....\$12.50

Southern Fdy. No. 2.....22.01

Lake Superior Charcoal.....27.04

Malleable.....18.50

FIRST QUALITY BRIGHT TIN PLATES

IC 20x28 112 sheets.....\$25.10

IX 20x28.....29.00

XXX 20x28 56 sheets.....16.20

XXXX 20x28.....17.55

XXXXX 20x28.....18.95

TERNE PLATES

Per Box

IC 20x28, 40-lb. 112 sheets.....\$26.00

IX 20x28, 40-lb. 112 sheets.....28.50

IC 20x28, 25-lb. 112 sheets.....31.75

IX 20x28, 25-lb. 112 sheets.....24.25

IC 20x28, 20-lb. 112 sheets.....20.00

IV 20x28, 20-lb. 112 sheets.....22.50

IC 20x28, 15-lb. 112 sheets.....18.50

"ARMCO" INGOT IRON PLATES

No. 8 ga. up to and including

1/4 in.—100 lbs.....\$4.55

COKE PLATES

Cokes, 30 lbs., base, 20x28.....\$12.60

Cokes, 30 lbs., base, 20x28.....12.80

Cokes, 100 lbs., base, 20x28.....14.00

Cokes, 100 lbs., base, IC

20x28.....14.30

Cokes, 135 lbs., base, IX

20x28.....16.40

Cokes, 150 lbs., base, 66

sheets.....9.20

Cokes, 175 lbs., base, 56

sheets.....10.05

Cokes, 195 lbs., base, 56

sheets.....10.90

BLUE ANNEALED SHEETS

Base 10 ga.....per 100 lbs. \$3.50

"Armco" 10 ga.....per 100 lbs. 4.00

ONE PASS COLD ROLLED BLACK

No. 18-20.....per 100 lbs. \$2.75

No. 22.....per 100 lbs. 3.90

No. 24.....per 100 lbs. 3.95

No. 26.....per 100 lbs. 4.05

No. 27.....per 100 lbs. 4.10

No. 28.....per 100 lbs. 4.20

No. 29.....per 100 lbs. 4.35

No. 30.....per 100 lbs. 4.45

"ARMCO" GALVANIZED

"Armco" 24.....per 100 lbs. \$6.15

GALVANIZED

No. 16.....per 100 lbs. \$4.30

No. 18.....per 100 lbs. 4.45

No. 20.....per 100 lbs. 4.60

No. 22.....per 100 lbs. 4.65

No. 24.....per 100 lbs. 4.80

No. 26.....per 100 lbs. 5.05

No. 27.....per 100 lbs. 5.15

No. 28.....per 100 lbs. 5.20

No. 30.....per 100 lbs. 5.70

HARD SOLDER

Warranted

50-50.....per 100 lbs. \$36.50

Commercial

45-55.....per 100 lbs. 22.50

Plumbers.....per 100 lbs. 30.50

ZINC

In Slabs.....\$ 8.50

SHEET ZINC

Cash Lots (600 lbs.).....\$12.00

Sheet Lots.....18.00

BRASS

Sheets, Chicago base.....17 1/2 c

Mill base.....21 1/2 c

Tubing, seamless base.....25 1/2 c

Wire, No. 9, B & S Ga. 18c

Wire, No. 10, B & S Ga. 19c

Wire, No. 11, B & S Ga. 19 1/2 c

Wire, No. 8, B & S Ga. and

heavier.....18 1/2 c

COPPER

Sheets, Chicago base.....22 1/2 c

Mill Base.....21 1/2 c

Tubing, seamless base.....25 1/2 c

Wire, No. 9, B & S Ga. 18c

Wire, No. 10, B & S Ga. 19c

Wire, No. 11, B & S Ga. 19 1/2 c

Wire, No. 8, B & S Ga. and

heavier.....18 1/2 c

LEAD

American Pig.....\$7.25
Bar.....8.25

TIN

Pig Tin.....per 100 lbs. \$65.25
Bar Tin.....per 100 lbs. 66.25

HARDWARE, SHEET METAL SUPPLIES, WARM AIR FURNACE FITTINGS AND ACCESSORIES.

ADAMS' SHEET METAL

7 inch, doz.....\$ 1.60
8 inch, doz.....2.20
9 inch, doz.....2.60
10 inch, doz.....2.80
12 inch, doz.....3.00
14 inch, doz.....3.00

DIGGERS

Post Hole
Iwan's Split Handle (Eureka)
4-ft. Handle.....per doz. \$14.00
7-ft. Handle.....per doz. 36.00
Iwan's Hercules pattern, per doz. 14.90

EAVES TROUGH

Galv. Crimpedge, crated 75 & 5%
Zinc, "Barnes".....60%

ELBOWS

Conductor Pipe
Galv. plain or corrugated, round flat Crimp.
22 Gauge.....60%
26 Gauge.....45%
24 Gauge.....15%

SQUARE CORRUGATED

No. 28 Gauge.....50%
36 Gauge.....35%

PORTICO ELBOWS

Standard Gauge Conductor Pipe, plain or corrugated.
Not nested.....70 & 5%
Nested solid.....70 & 5%

SC. CORR. A. & B. & OCTAGON

22 Ga.50%
26 Ga.35%

PORTICO

1", 1 1/4", 1 1/2".....45%

COPPER

16 oz., all designs.....45%

ZINC

All styles.....60%

ELBOWS—STOVE PIPE

1-piece Corrugated, Uniform Blue
"Milcor" No. 28 Gauge. Doz. \$1.25
5-inch.....1.35
6-inch.....1.75

SPECIAL CORRUGATED

6-inch.....\$1.00
7-inch.....1.60

Adjustable—Uniform Blue
"Milcor" No. 28 Gauge. Uniform Blue.
5-inch.....\$1.75
6-inch.....1.85
7-inch.....2.15

WOOD FACES—50% off list.

FENCE
726-6-12 1/4% (100 rods).....\$28.68
1948-6-14 1/4% (100 rods).....43.62

FILES AND RASPS

Heller's (American).....50-10%
American.....60-10%
Arcade.....50%
Black Diamond.....50%
Eagle.....50%
Great Western.....50%
Kearney & Foot.....50%
McClellan.....50%
Nicholson.....50%
Simonds.....50%

NO. 2 CHECK

8 inch, each.....1.00
9 inch, each.....1.00
10% Disc. on Adams No. 1 and No. 2 Check
Diamond Smoke Pipe
7 inch, doz.....\$ 2.00
8 inch, doz.....2.20
9 inch, doz.....2.50
10 inch, doz.....3.00
West of above boundary.....45%

FIRE POTS

Clayton & Lambert's
East of west boundary line of Province of Manitoba, Canada, No. Dakota, So. Dakota, Nebraska, Kansas, Oklahoma, Amarillo, San Angelo and Laredo, Texas.....50%
West of above boundary.....45%

Geo. W. Diener Mfg. Co.

Pa. No. 02 Gasoline Torch, 1 qt.....\$ 5.55

No. 9250, Kerosene, or Gasoline Torch, 1 qt....7.50

No. 10 Tinner's Furn. Square tank, 1 gal....12.00

No. 15 Tinner's Furn. Round tank, 1 gal....12.00

No. 21 Gas Soldering Furnace.....3.00

No. 110 Automatic Gas Soldering Furnace....10.50

Double Blast Mfg. Co. Gasoline, Nos. 25 and 36...60%

QUICK MEAL STOVE CO.

Vesuvius, F. O. B. St. Louis 30% (Extra Disc. for large quantities.)

GLASS

Single Strength, A, 25-in. brackets.....87%

Single Strength, A, 34 to 40-in. bracket.....86%

Single Strength, A, all other brackets.....89%

Double Strength, A, all sizes.....86%

HANGERS

Conductor Pipe

Milcor Perfection Wire....25%

Milcor Triplex Wire....10%

EAVES TROUGH

Milcor Steel (galv. after forming) List....plus 12 1/2%

Milcor Selflock E. T. Wire, List.....plus 50%

HOOKS

Box V. & B. No. 1, each.....\$0.26

Conductor

"Direct Drive" Wrought Iron for wood or brick....15%

Hay

V. & B. No. 1, each.....\$0.26

HUMIDIFIER

"Front-Rank," Automatic

In single lots.....50%

In lots of 10 or more...50-5%

In lots of 25 or more...50-10%

Vapor pans, etc., each.....50%

LIFTERS

Stove Cover

Coppered.....per gro. \$8.00

Alaska.....per gro. 4.75

MALLETS

Tinners

Hickoryper doz. \$2.25

MITRES

Galvanized steel mitres,

23 Ga.70

26 Ga.60-20

NAILS

Cut Steel

.....\$4.25

Cut Iron.....4.25

Wire

Common2.95

Cement Coated2.95

(Continued on Page 90)

If It's a Sheet Metal Screw You Need
—“WE HAVE IT”—



Figure 1
Packed 1 Gross or 1000 Per Box

Round Head

Size, In.
3/32 x $\frac{1}{8}$
 $\frac{1}{16}$ x $\frac{1}{8}$
3/16 x $\frac{1}{8}$
3/16 x $\frac{1}{4}$
 $\frac{1}{4}$ x $\frac{1}{8}$
 $\frac{1}{4}$ x $\frac{1}{4}$



Figure 2

Packed 1 Gross or 1000 Per Box

Parker Sheet Metal Screws

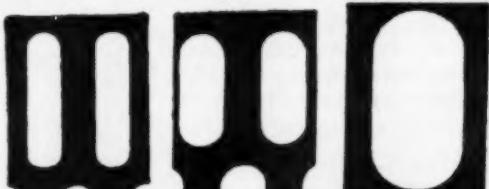
Are made of high grade steel, heat treated and hardened. Threads will cut into sheet metal in the same manner as Wood Screws seat in wood. Especially adapted for joining sheet metal, or attaching fixtures to metal trim.

To Use Sheet Metal Screws: First punch hole through sheets of metal to be joined, making hole a little smaller than outside diameter of screw. Hole can be punched with prick punch, but we recommend the use of the Stop Punch, which not only punches the exact size of hole but slightly upsets the metal, as shown in Figure 1. After punching hole, use screwdriver to draw the screw up to its head, as shown in Figure 2. The tighter the screw is drawn up, the stronger the fastening is made.

THE J. M. & L. A.
OSBORN CO.
CLEVELAND

"Everything Used in Sheet Metal Work"

PERFORATED METALS



All Sizes and Shapes of Holes
In Steel, Zinc, Brass, Copper, Tinplate, etc.
For All Screening, Ventilating and Draining
EVERYTHING IN PERFORATING METAL

THE HARRINGTON & KING PERFORATING CO.
5649 FILLMORE ST.—CHICAGO, ILL., U. S. A.
NEW YORK OFFICE, 114 LIBERTY ST.

CHICAGO STEEL CORNICE BRAKES STANDARD OF THE WORLD



THE BEST BRAKE
FOR ALL PUR-
POSES: Most Dur-
able, Easiest Oper-
ated, Low in Price;
Made in All Lengths
and to Bend All
Gauges of Metal.
Over 23,000 in use.

WRITE FOR
PARTICULARS

DREIS & KRUMP MFG. CO., 7404 Loomis Street, CHICAGO

Round
Corrugated

Plain Round



NEVER MADE WITHOUT THIS

TRADE **F. Dieckmann** MARK

Quality and Service Made 'em Famous

Made of one piece of heavy gauge material, in all styles and angles from 10 to 90 degrees, of 24, 26, 28 ga. ternes, then galvanized after formation.

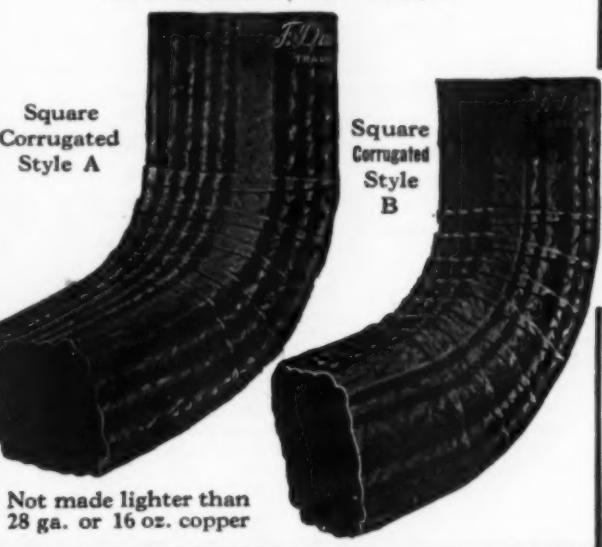
DIECKMANN Elbows and Shoes

are the standard of the market
and always give satisfaction

Send for new catalogue 26 showing complete line

The Ferdinand Dieckmann Co.

P. O. Station B, Cincinnati, O.



Not made lighter than
28 ga. or 16 oz. copper

ADVERTISERS' INDEX

The dash (—) indicates that the advertisement runs on a regular schedule but does not appear in this issue.

A	M
Aeolus-Dickinson Co.	93
Agricola Furnace Co.	—
Akrat Ventilators, Inc.	95
American Foundry & Furnace Co.	—
American Furnace Co.	—
Armclo Distributors Assn. of America	87
American Steel & Wire Co.	93
Arex Co.	96
Armstrong Co.	—
Auditorium Hotel	—
Auer Register Co.	63
Automatic Humidifier Co.	—
B	N
Barnes Zinc Products Co.	—
Beh & Co.	63
Berger Bros. Co.	91
Berger Co., L. D.	89
Bertsch & Co.	93
Brillion Furnace Co.	—
Buckeye Products Co.	—
Burgess Soldering Furnace Co.	—
Burton Co., W. J.	—
C	O
Calkins & Pearce	—
Central Alloy Steel Corp.	—
Chicago Elbow Machine Co.	—
Chicago Solder Co.	—
Clayton & Lambert Mfg. Co.	91
Cleveland Castings Pattern Co.	62
Colburn Heater Co.	—
Connors Paint Co., Wm.	—
Copper & Brass Research Association	—
D	P
Davis Co., Herbert H.	—
Dieckmann Co., Ferdinand	89
Diener Mfg. Co., Geo. W.	91
Dreis & Krump Mfg. Co.	89-91
E	R
Eaglesfield Ventilator Co.	—
F	S
Fanner Mfg. Co.	—
Forest City Fdy. & Mfg. Co.	—
Floral City Heater Co.	60
Fort Shelby Hotel	—
Friedley-Voshardt Co.	91
G	T
Gerock Bros. Mfg. Co.	91
H	U
Harrington & King Perf. Co.	89
Hart & Cooley Co.	6
Henry Furnace & Fdy. Co.	61
Hess-Snyder Co.	—
Hessler Co., H. E.	—
Hyro Mfg. Co.	—
I	V
Independent Register & Mfg. Co.	63
Inland Steel Co.	—
International Heater Co.	—
K	W
Keith Furnace Co.	—
Kernchen Co.	—
Kirk-Latty Co.	62
L	W
Lamneck & Co., W. E.	—
Lamson & Sessions Co., The	62
Langenberg Mfg. Co.	58
Lennox Furnace Co.	—
Liberty Foundry Co.	—
Linde Air Products Co.	—
Lupton's Sons Co., David	—

Markets—Continued from Page 88

NETTING, POULTRY

Galvanized before weaving	57½-6%
Galvanized after weaving	52½-5%

PASTE

Asbestos Dry Paste:	
200-lb. barrel	\$16.00
100-lb. barrel	8.75
35-lb. pail	3.50
10-lb. bag	1.10
5-lb. bag	.60
2½-lb. cartons	.35

PIPE

Conductor	Cor. Rd., Plain Rd., or Sq.
-----------	-----------------------------

Galvanized

Crated and nested (all gauges)	75-2½%
Crated and not nested (all gauges)	70-15%

Furnace Pipe

Double Wall Pipe and Fittings	40-10%
Single Wall Pipe, Round	40-10%
Galvanized and Tin Fittings	40-10%

Lead

Per 100 lbs.	\$12.50
--------------	---------

Stove Pipe

"Milcor" "Titelock" Uniform Blue Stove	
28 gauge, 5 inch U. C. nested	11.50
28 gauge, 6 inch U. C. nested	12.25
28 gauge, 7 inch U. C. nested	14.25
30 gauge, 5 inch U. C. nested	10.50
30 gauge, 6 inch U. C. nested	11.25
30 gauge, 7 inch U. C. nested	13.25

T-Joint Made up

6-inch, 28 ga....per doz.	\$5.00
---------------------------	--------

All Zinc

No. 11, all styles	60%
--------------------	-----

POKERS, STOVE

W'r't Steel, str't or bent, per doz.	\$0.75
Nickel Plated, coll handles, per doz.	1.10

POKERS, FURNACE

Each	\$0.50
------	--------

PULLEYS

Furnace Tackle....per doz.	\$0.60
per gro.	6.00

Furnace Screw (enamored)....per doz.	75
--------------------------------------	----

Ventilating Register

Per gross	9.00
Small, per pair	.30

Large, per pair	.50
-----------------	-----

PUTTY

Commercial Putty, 100-lb. Kits	\$3.40
--------------------------------	--------

QUADRANTS

Malleable Iron Damper	10%
-----------------------	-----

REDUCERS—Oval Stove Pipe

Per Doz.	
7-6, 1 doz. in carton	\$2.25

REGISTERS AND BORDERS

Baseboard, Floor and Wall	
---------------------------	--

Cast Iron	20%
-----------	-----

Steel and Semi-Steel	40%
----------------------	-----

Baseboard	40%
-----------	-----

Wall	40%
------	-----

Adjustable Ceiling Ventilators	40%
--------------------------------	-----

REGISTER FACES—Cast and Steel

Japanned, Bronzed and Plated, 4x6 to 14x14	40%
--	-----

Large Register Faces—Cast, 14x14 to 38x42	60%
---	-----

Large Register Faces—Steel, 14x14 to 38x42	65%
--	-----

RIDGE ROLL

Galv., Plain Ridge Roll, b'did	75-10-5%
--------------------------------	----------

Galv., Plain Ridge Roll, crated	75-10%
---------------------------------	--------

Globe Finials for Ridge Roll	50%
------------------------------	-----

ROOFING

Per Square

Best grade, slate surf. prepared	\$2.30
Best talc surfaced	2.65
Medium talc surfaced	2.00
Light talc surfaced	1.20
Red Rosin Sheetimg, per ton	57.00

SCREWS

Sheet Metal	
7, ½x½, per gross	.30 .52
No. 10, ¾x3/16, per gross	.68
No. 14, ¾x½, per gross	.89

SHREWS, TINNERS' & MACHINISTS'

Viking	\$22.00
--------	---------

Lennox Throatless	
-------------------	--

No. 18	35%
--------	-----

Shear blades	10%
--------------	-----

(f. o. b. Marshalltown, Iowa)	
-------------------------------	--

SHIELDS, REGISTER

No. 1 "Gem" floor	\$12.00 doz.
-------------------	--------------

No. 2 "Gem" wall	6.00 doz.
------------------	-----------

SHOES

Galv. 28 Gauge, Plain or corrugated round flat crimp	60%
--	-----

26 gauge round flat crimp	45%
---------------------------	-----

24 gauge round flat crimp	15%
---------------------------	-----

SNIPS, TINNERS'

Clover Leaf	40 & 10%
-------------	----------

National	40 & 10%

<tbl_r cells="2"

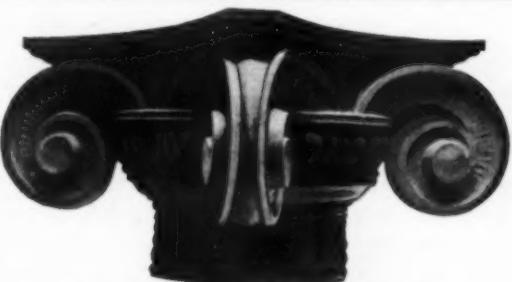


ARCHITECTURAL
SHEET METAL
ORNAMENTS
Made of
ZINC
COPPER
BRONZE
OR
LEAD
Also
METAL CEILINGS

SPECIALISTS IN SPECIAL WORK
ESTIMATES SUBMITTED ON RECEIPT
OF
BLUE PRINTS OR DRAWINGS

Ornamental Catalogue No. 50 on request

FRIEDLEY - VOSHARDT CO.
Office: 733-737 So. Halsted St.
Factory: 761-771 Mather St.
CHICAGO ILLINOIS
Milwaukee Office: 853 Grant Blvd.



GEROCK BROS. MFG. CO.
SHEET METAL ORNAMENTS
AND STATUARY
1252 So. Vandeventer Ave., St. Louis, Mo., U.S.A.
Write for Catalogue

VESUVIUS

BLOW TORCHES

in pint or quart sizes.
With quickly removable soldering iron hooks.

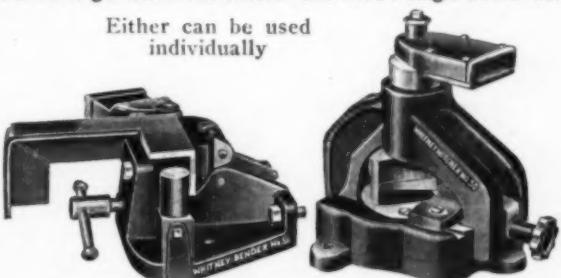
Vesuvius Blow Torches are made of brass or non-corrosive oxydized terne plate. The latter is particularly recommended for hard usage.

Write for prices and illustrated circular today

QUICK MEAL STOVE COMPANY
Div. American Stove Company
825 Chouteau Ave. St. Louis, Mo.

No. 50 Angle Iron Mitre Notcher and No. 51 Angle Iron Bender

Either can be used individually



CAPACITY 2" x 2" x 1/4" ANGLE IRON OR SMALLER
Weight of Mitre Notcher only.....64 lbs.
Weight of Mitre Notcher Bender only.....42 lbs.
Write for prices and catalog on entire line

WHITNEY METAL TOOL COMPANY
93 FORBES ST. ROCKFORD, ILL. 14

-B.B.- LINE OF SHEET METAL SUPPLIES

B.B. CONDUCTOR HOOKS AND GUTTER HANGERS
"SHUR-LOCK" CONDUCTOR PIPE
OCTAGON AND POLYGON CONDUCTOR PIPE
"E-Z FIT" EAVES TROUGH
"QUAKER CITY" MITRES, ENDS, CAPS AND OUTLETS
EAVE TROUGH STRAP AND ROD HANGERS
ORNAMENTAL CONDUCTOR STRAPS AND ENDS

YOUR JOBBER CARRIES THEM IN STOCK FOR PROMPT SHIPMENT

Manufactured by
BERGER BROS. CO.
229 to 237 ARCH STREET PHILADELPHIA 1



"Torrid" Tinner's Furnaces

have stood the test of time. Imitations come, go, are changed but "Torrid" standard is unalterable and price always right.

GEO. W. DIENER MFG. CO., CHICAGO
Makers of fine Blow Torches and Fire Pots.

Read the Wants and Sales Pages

CHICAGO STEEL SLITTING SHEAR

LIGHT—POWERFUL DURABLE

Capacity 10 gauge sheets
Any Length or Width
Flat Bars 3/16x2"
Weight 22 pounds
Price \$12.50 Net
F. O. B. Chicago

Made of pressed steel and equipped with hold-down. Blades of highest grade crucible steel. Most indispensable high grade shears made. Equal to other shears selling at over twice the price. **ORDER YOURS TODAY.**

DREIS & KRUMP MFG. CO., 7404 Loomis St., Chicago

BUYERS' DIRECTORY

Acetylene (Gas) Dissolved.	Barnes Zinc Products Co., Chicago, Ill.	Rybolt Heater Co., Ashland, Ohio	Machines—Tinsmiths.
Prest-O-Lite Co., Inc., New York, N. Y.	Standard Furnace & Supply Co., Omaha, Neb.	Bertsch & Co., Cambridge City, Ind.	
Air Filters.	St. Louis Heating Co., St. Louis, Mo.	Burton Co., The W. J., Detroit, Mich.	
Reed Air Filter Co., Louisville, Kentucky	Success Heater Mfg. Co., Des Moines, Iowa	Chicago Elbow Machine Co., Oak Park, Ill.	
Bale Ties.	Thomas & Armstrong Co., London, Ohio	Dreis & Krump Mfg. Co., Chicago, Ill.	
American Steel & Wire Co., Chicago, Ill.	Thatcher Co., Chicago, Ill.	Marshalltown Mfg. Co., Marshalltown, Iowa	
Blowers.	XX Century Heating & Ventilating Co., Akron, Ohio	Osborn Co., The J. M. & L. A., Cleveland, Ohio	
Sturtevant Co., B. F., Boston, Mass.	Utica Heater Co., Utica, N. Y.	Peck, Stow & Wilcox Co., Southington, Conn.	
Bolts—Studs.	Waterman-Waterbury Co., Minneapolis, Minn.	Ryerson & Son, Inc., Jos. T., Chicago, Ill.	
The Kirk-Latty Co., Cleveland, Ohio	Western Steel Products Co., Duluth, Minn.	Unishear Co., Inc., New York, N. Y.	
Lamson & Sessions Co., Cleveland, Ohio	Wise Furnace Co., Akron, Ohio	Whitney Mfg. Co., W. A., Rockford, Ill.	
Ryerson & Son, Inc., Jos. T., Chicago, Ill.	Garages—Metal.	Whitney Metal Tool Co., Rockford, Ill.	
Brakes—Bending.	The Thomas & Armstrong Co., London, Ohio	Mandrels.	
Dreis & Krump Mfg. Co., Chicago, Ill.	Gas (Acetylene) Dissolved.	Hyro Mfg. Co., New York, N. Y.	
Ryerson & Son, Inc., Jos. T., Chicago, Ill.	Prest-O-Lite Co., Inc., New York, N. Y.	Metals—Perforated.	
Brakes—Cornice.	Gas (Nitrogen).	Harrington & King Perforating Co., Chicago, Ill.	
Dreis & Krump Mfg. Co., Chicago, Ill.	Linde Air Products Co., New York, N. Y.	Miters.	
Brass and Copper.	Gas (Oxygen).	Friedley-Voshardt Co., Chicago, Ill.	
Copper & Brass Research Association, New York	Linde Air Products Co., New York, N. Y.	Milwaukee Corrugating Co., Mill, Ch'go, La Crosse, Kan. City	
Merchant & Evans Co., Philadelphia, Pa.	Glass—Wire.	Miters—Eaves Trough.	
Cans—Garbage.	Lupton's Sons Co., David, Philadelphia, Pa.	Barnes Zinc Products Co., Chicago, Ill.	
Osborn Co., The J. M. & L. A., Cleveland, Ohio	Grilles.	Lupton's Sons Co., David, Philadelphia, Pa.	
Castings—Malleable.	Auer Register Co., Cleveland, Ohio	Milwaukee Corrugating Co., Mill, Ch'go, La Crosse, Kan. City	
Fanner Mfg. Co., Cleveland, Ohio	Harrington & King Perforating Co., Chicago, Ill.	Nails—Hardened Masonry.	
Ceilings—Metal.	Hart & Cooley Co., New Britain, Conn.	Parker-Kalon Corp., New York, N. Y.	
Burton Co., The W. J., Detroit, Mich.	Independent Reg. Co., Cleveland, Ohio	Nails—Wire.	
Friedley-Voshardt Co., Chicago, Ill.	Tuttle & Bailey Mfg. Co., Chicago, Ill.	American Steel & Wire Co., Chicago, Ill.	
Milwaukee Corrugating Co., Mill, Ch'go, La Crosse, Kan. City	United States Register Co., Battle Creek, Mich.	Nitrogen (Gas).	
Wheeling Corrugating Co., Wheeling, W. Va.	Furnace Cement—Asbestos.	Linde Air Products Co., New York, N. Y.	
Chaplets.	Armstrong Co., The, Detroit, Mich.	Ornaments—Sheet Metal.	
Fanner Mfg. Co., Cleveland, Ohio	Buckeye Products Co., The, Cincinnati, Ohio	Friedley-Voshardt Co., Chicago, Ill.	
Chimney Tops.	Connors Paint Mfg. Co., Wm.	Gerock Bros. Mfg. Co., St. Louis, Mo.	
Standard Ventilator Co., Lewisburg, Pa.	Milwaukee Corrugating Co., Mill, Ch'go, La Crosse, Kan. City	Milwaukee Corrugating Co., Mill, Ch'go, La Crosse, Kan. City	
Vall Mfg. Co., Fort Wayne, Ind.	Furnace Cement—Liquid.	Oxygen (Gas).	
Check Drafts.	Technical Products Co., Pittsburgh, Pa.	Linde Air Products Co., New York, N. Y.	
Teela Sheet Metal Co., Oshkosh, Wis.	Furnace Cleaners—Auction.	Paint.	
Clinker Tongs.	Brillion Furnace Co., Brillion, Wis.	Connors Paint Mfg. Co., Wm., Troy, N. Y.	
L. J. Mueller Furnace Co., Milwaukee, Wis.	Sturtevant Co., B. F., Boston, Mass.	Pecora Paint Co., Philadelphia, Pa.	
Clips—Roofing.	Furnace Fans.	Patterns—Furnace & Stove.	
Wm. Pfeifer, New York, N. Y.	A. H. Robinson Company, Massillon, Ohio	Cleveland Castings Pattern Co., Cleveland, Ohio	
Coal Chutes.	Robinson Furnace Co., Chicago	Quincy Pattern Co., Quincy, Ill.	
Majestic Co., The, Huntington, Ind.	Sturtevant Co., B. F., Boston, Mass.	Vedder Pattern Works, Troy, N. Y.	
Copper.	Warm Air Furnace Fan Co., The, Cleveland, Ohio	Pipe and Fittings—Furnace.	
Copper & Brass Research Association, New York	Furnace Rings.	Burton Co., The W. J., Detroit, Mich.	
Cornices.	Milwaukee Corrugating Co., Milwaukee, Wis.	Henry Furnace & Fdy. Co., Cleveland, Ohio	
Friedley-Voshardt Co., Chicago, Ill.	Walworth Run Fdy. Co., Cleveland, Ohio	International Heater Co., Monroe, Mich.	
Milwaukee Corrugating Co., Mill, Ch'go, La Crosse, Kan. City	Furnaces—Gas.	Lamneck Co., W. E., Columbus, Ohio	
Cut-offs—Rain Water.	Calkins & Pearce, Columbus, Ohio	Meyer Furnace Co., The, Utica, New York	
Milwaukee Corrugating Co., Mill, Ch'go, La Crosse, Kan. City	Furnaces—Warm Air.	L. J. Mueller Furnace Co., Peoria, Ill.	
Dampers—Quadrants—Accessories.	American Furnace Co., St. Louis, Mo.	Milwaukee Corrugating Co., Mill, Ch'go, La Crosse, Kan. City	
Milwaukee Corrugating Co., Mill, Ch'go, La Crosse, Kan. City	American Foundry & Furnace Co., Bloomington, Ill.	Milwaukee Furnace Co., L. J., Milwaukee, Wis.	
L. J. Mueller Furnace Co., Milwaukee, Wis.	Brillion Iron Works, Brillion, Wis.	Osborn Co., The J. M. & L. A., Cleveland, Ohio	
Parker-Kalon Corp., New York, N. Y.	Calkins & Pearce, Columbus, Ohio	Robinson Furnace Co., Chicago, Ill.	
Diffuser—Air Duct.	Colburn Heater Co., Chicago, Ill.	Standard Furnace & Supply Co., Omaha, Neb.	
Aeolus-Dickinson Co., Chicago, Ill.	Floral City Heater Co., Monroe, Mich.	Waterman-Waterbury Co., Minneapolis, Minn.	
L. J. Mueller Furnace Co., Milwaukee, Wis.	Forest City Fdy. & Mfg. Co., Cleveland, Ohio	Heaters—Cabinet.	
Doors—Metal.	Henry Furnace & Fdy. Co., Cleveland, Ohio	Majestic Co., The, Huntington, Ind.	
Lupton's Sons Co., David, Philadelphia, Pa.	Hess-Snyder Co., Massillon, Ohio	Mueller Furnace Co., L. J., Milwaukee, Wis.	
Drive Screws—Hardened Metallic.	Homer Furnace Co., Massillon, Ohio	Standard Furnace & Supply Co., Omaha, Neb.	
Parker-Kalon Corp., 354 West 13th St., New York	Coldwater, Mich.	Waterman-Waterbury Co., Minneapolis, Minn.	
Eaves Trough.	International Heater Co., Utica, N. Y.	Heaters—Gas.	
Barnes Zinc Products Co., Chicago, Ill.	Keith Furnace Co., Des Moines, Ia.	Calkins & Pearce, Columbus, Ohio	
Berger Bros. Co., Philadelphia, Pa.	Lamneck Co., W. E., Columbus, Ohio	Heaters—School Room.	
Burton Co., The W. J., Detroit, Mich.	Langenberg Mfg. Co., St. Louis, Mo.	Floral City Heater Co., Monroe, Mich.	
Berger Co., L. D., Philadelphia, Pa.	Lennox Furnace Co., Marshalltown, Ia.; Syracuse, N. Y.	International Heater Co., Utica, New York	
Lupton's Sons Co., David, Philadelphia, Pa.	Majestic Co., The, Huntington, Ind.	Meyer Furnace Co., The, Peoria, Ill.	
Milwaukee Corrugating Co., Mill, Ch'go, La Crosse, Kan. City	May-Fiebeger Furnace Co., Newark, Ohio	L. J. Mueller Furnace Co., Milwaukee, Wis.	
May-Fiebeger Furnace Co., Newark, Ohio	Meyer Furnace Co., The, Peoria, Ill.	Milwaukee Corrugating Co., Mill, Ch'go, La Crosse, Kan. City	
Meyer Furnace Co., Cedar Falls, Iowa	Monitor Furnace Co., Peoria, Ill.	Milwaukee Furnace Co., L. J., Milwaukee, Wis.	
Automatic Humidifier Co., Cedar Falls, Iowa	Cincinnati, Ohio	Osborn Co., The J. M. & L. A., Cleveland, Ohio	
L. J. Mueller Furnace Co., Milwaukee, Wis.	Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.	Robinson Furnace Co., Chicago, Ill.	
Robinson Furnace Co., Peoria, Ill.	Mueller Furnace Co., L. J., Milwaukee, Wis.	Standard Furnace & Supply Co., Omaha, Neb.	
Robinson Furnace Co., Peoria, Ill.	Richardson & Boynton Co., New York, N. Y.	Waterman-Waterbury Co., Minneapolis, Minn.	
Robinson Furnace Co., Peoria, Ill.	Robinson Furnace Co., A. H., Massillon, Ohio	Heaters—Crimping.	
Rudy Furnace Co., Dowagiac, Mich.	Robinson Furnace Co., Chicago, Ill.	Bertsch & Co., Cambridge City, Ind.	
Wheeling Corrugating Co., Wheeling, W. Va.	Rudy Furnace Co., Dowagiac, Mich.	Machinery—Culvert.	
		Bertsch & Co., Cambridge City, Ind.	

Announcing

A Series
of
Articles
on

Farm Ventilation

by

Prof. A. J. Mack

Department of Mechanical Engineering

KANSAS STATE
AGRICULTURAL COLLEGE

See page 71
this issue for
first article

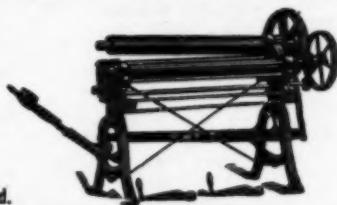
AMERICAN ARTISAN

50-INCH FORMING ROLL

This Forming Roll is built in all standard sizes, with our Patented Opening Device by means of which it is opened and closed in a few seconds.

We build a complete line of Shears and punches, all sizes, for hand or bell power.

Write for Catalog "R"
BERTSCH & CO., Cambridge City, Ind.



Send for catalog today

VIKING SHEAR
Compound LEVER Handle—Removable Blades
A child can work them
VIKING SHEAR CO., Erie, Pa.

Say you saw it in AMERICAN ARTISAN—Thank you!

WIRE

electrical,
rope, barb-
ed, plain,
nails (bright

and coated), tacks, spikes, bale ties, hoops, springs, netting, wire fences, steel posts, steel gates, trolley wire, rail bonds, flat wire, cold rolled strip steel, piano wire, round and odd-shape wire, screw stock, welding wire, concrete reinforcement. Aerial tramways.

Illustrated books describing uses, FREE

**American Steel & Wire
Company**

The NEW IMPROVED "STANDARD"



"Standard" Ventilator and Chimney Cap—
Most Efficient Combination on the market.

ROTATABLE VENTILATOR

THIS favorite ventilator has been further improved to insure—

Greater Durability
Quieter Operation
Greater Efficiency
Better Balance

The New Cone-top Suspension, new Bronze Guide Bushings, and Cross-Braced Skirt are the new features.

Let us tell you in detail all about this better ventilator.

Write for special circular and
prices today

STANDARD VENTILATOR CO., Lewisburg, Pa.



The 12-Cylinder Ventilator
Used in Every State
in the Union.

SPECIFY AEOLUS
VENTILATORS

ÆOLUS FOR HOMES

The home should be properly ventilated—few of them are. Here is a sales opportunity often overlooked by the average Sheet Metal Worker, but one which offers a lucrative business to those who take advantage of it.

Æolus-Dickinson

Vent Makers Since 1888
3332-52 South Artesian Avenue
CHICAGO
Phone: Lafayette 1862-1863



VAIL'S ADJUSTABLE CAST IRON SWING CHIMNEY TOP

Fits any size stack—6" to 10" inclusive. Inexpensive, simple and durable. Satisfaction guaranteed.

Write for Circulars and Prices

VAIL MANUFACTURING CO.
1017 Columbia Ave. Fort Wayne, Indiana

Say you saw it in AMERICAN ARTISAN—Thank you!

BUYERS' DIRECTORY

Posts—Steel Fence.
American Steel & Wire Co.,
Chicago, Ill.

Punches.

Bertsch & Co.,
Cambridge City, Ind.
Peck, Stow & Wilcox Co.,
Southington, Conn.
Ryerson & Son, Inc., Jos. T.,
Chicago, Ill.
Whitney Mfg. Co., W. A.,
Rockford, Ill.
Whitney Metal Tool Co.,
Rockford, Ill.

Punches—Combination Bench and Hand.

Hyro Mfg. Co., New York, N. Y.
Ryerson & Son, Inc., Jos. T.,
Chicago, Ill.
Whitney Metal Tool Co.,
Rockford, Ill.
Whitney Mfg. Co., W. A.,
Rockford, Ill.

Punches—Hand.

Hyro Mfg. Co., New York, N. Y.
Ryerson & Son, Inc., Jos. T.,
Chicago, Ill.
Whitney Metal Tool Co.,
Rockford, Ill.
Whitney Mfg. Co., W. A.,
Rockford, Ill.

Putty—Stove.

Connors Paint Mfg. Co., Wm.,
Troy, N. Y.
Pecora Paint Co.,
Philadelphia, Pa.

Radiator Cabinets.
The Hart & Cooley Mfg. Co.,
New Britain, Conn.
Tuttle & Bailey Mfg. Co.,
Chicago, Ill.

Radiators—Shields.

Beh & Co., Inc., New York, N. Y.
The Thomas & Armstrong Co.,
London, Ohio

Ranges—Combination Gas & Coal.

Quick Meal Stove Co.,
St. Louis, Mo.
Thatcher Co.,
Newark, N. J.

Ranges—Gas.

Quick Meal Stove Co.,
St. Louis, Mo.

Register Shields.

Beh & Co., Inc., New York, N. Y.

Registers—Warm Air.

Auer Register Co., Cleveland, Ohio
Hart & Cooley Co.,
New Britain, Conn.
Henry Furnace & Fdy. Co.,
Cleveland.
Independent Register & Mfg. Co.,
Cleveland, Ohio
Lamneck & Co., W. E.,
Columbus, Ohio

Majestic Co., The,
Huntington, Ind.
Meyer & Bro. Co., F., Peoria, Ill.

Milwaukee Corrugating Co.,
Mil., Ch'go, La Crosse, Kan.
Mueller Furnace Co., L. J.,
Milwaukee, Wis.

Robinson Furnace Co.,
Chicago, Ill.
Rock Island Register Co.,
Rock Island, Ill.

Standard Furnace & Supply Co.,
Omaha, Neb.
Tuttle & Bailey Mfg. Co.,
Chicago, Ill.

United States Register Co.,
Battle Creek, Mich.
Walworth Run Fdy. Co.,
Cleveland, Ohio

Registers—Wood.

Auer Register Co., Cleveland, Ohio
Eaglesfield Ventilator Co.,
Indianapolis, Ind.
Milwaukee Corrugating Co.,
Mil., Ch'go, La Crosse, Kan. City
L. J. Mueller Furnace Co.,
Milwaukee, Wis.

United States Register Co.,
Battle Creek, Mich.

Repairs—Stove and Furnace.

Hessler Co., H. R.,
Syracuse, N. Y.
Niehaus Furnace Repair Co.,
Cleveland, Ohio—Cincinnati
Northwestern Stove Repair Co.,
Chicago, Ill.

Ridging.

American Rolling Mill Co.,
Middletown, Ohio
Lupton's Sons Co., David,
Philadelphia, Pa.
Milwaukee Corrugating Co.,
Mil., Ch'go, La Crosse, Kan. City

Rivets—Stove.
The Kirk-Latty Co.,
Cleveland, Ohio

Lamson & Sessions Co.,
Cleveland, Ohio
Ryerson & Son, Inc., Jos. T.,
Chicago, Ill.

Rods—Stove.
The Kirk-Latty Co.,
Cleveland, Ohio
Lamson & Sessions Co.,
Cleveland, Ohio

Rolls—Forming.
Bertsch & Co.,
Cambridge City, Ind.

Roofing Cement.
Connors Paint Mfg. Co., Wm.,
Troy, N. Y.
Pecora Paint Co.,
Philadelphia, Pa.

Roof—Flashing.
Hessler Co., H. E., Syracuse, N. Y.
Milwaukee Corrugating Co.,
Milwaukee, Wis.

Roofing—Iron and Steel.
American Rolling Mill Co.,
Middletown, Ohio
Burton Co., The W. J.,
Detroit, Mich.

Friedley-Voshardt Co.,
Chicago, Ill.
Inland Steel Co.,
Chicago, Ill.
Merchant & Evans Co.,
Philadelphia, Pa.

Shingles—Zinc.
Milwaukee Corrugating Co.,
Mil., Ch'go, La Crosse, Kan. City
Osborn Co., The J. M. & L. A.,
Cleveland, Ohio

Ryerson & Son, Inc., Jos. T.,
Chicago, Ill.
Wheeling Corrugating Co.,
Wheeling, W. Va.

Roofing—Tin.
Milwaukee Corrugating Co.,
Mil., Ch'go, La Crosse, Kan. City
Taylor Co., N. & G.,
Philadelphia, Pa.

Roofing—Zinc.
Milwaukee Corrugating Co.,
Mil., Ch'go, La Crosse, Kan. City

Sifters—Ash.
Diener Mfg. Co., G. W.,
Chicago, Ill.

Sky Lights.

Lupton's Sons Co., David,
Philadelphia, Pa.
Milwaukee Corrugating Co.,
Mil., Ch'go, La Crosse, Kan. City

Ships.
Peck, Stow & Wilcox Co.,
Southington, Conn.
Ryerson & Son, Inc., Jos. T.,
Chicago, Ill.

Soldier.

Chicago Solder Co., Chicago, Ill.
Double-Duty Elbow Co.,
Aurora, Ill.

Milwaukee Corrugating Co.,
Mil., Ch'go, La Crosse, Kan. City

Soldering Furnaces.
Burgess Soldering Furnace Co.,
Columbus, Ohio
Clayton & Lambert Mfg. Co.,
Detroit, Mich.

Diener Mfg. Co., G. W.,
Chicago, Ill.
Double Blast Mfg. Co.,
North Chicago, Ill.

Quick Meal Stove Co.,
St. Louis, Mo.
Ryerson & Son, Inc., Jos. T.,
Chicago, Ill.

Soldering Supplies.
Double-Duty Elbow Co.,
Aurora, Ill.

Special Chemicals Co.,
Waukegan, Ill.

Specialties—Hardware.
Diener Mfg. Co., G. W.,
Chicago
Hessler Co., H. E., Syracuse, N. Y.

Stars—Hard Iron Cleaning.
Fanner Mfg. Co., Cleveland, Ohio

Statuary.
Friedley-Voshardt Co.,
Chicago, Ill.
Grock Bros. Mfg. Co.,
St. Louis, Mo.

Stove Pipe Reducers.
Milwaukee Corrugating Co.,
Mil., Ch'go, La Crosse, Kan. City

Stoves—Camp.

Quick Meal Stove Co.,
St. Louis, Mo.

Stoves—Gasoline and Oil.

Quick Meal Stove Co.,
St. Louis, Mo.

Sheets—Black and Galvanized.
American Rolling Mill Co.,
Middletown, Ohio
Burton Co., The W. J.,
Detroit, Mich.

Central Alloy Steel Corp.,
Massillon, Ohio
Inland Steel Co.,
Chicago, Ill.
Merchant & Evans Co.,
Philadelphia, Pa.

Milwaukee Corrugating Co.,
Mil., Ch'go, La Crosse, Kan. City
Osborn Co., The J. M. & L. A.,
Cleveland, Ohio

Ryerson & Son, Inc., Jos. T.,
Chicago, Ill.
Taylor Co., N. & G.,
Philadelphia, Pa.

Wheeling Corrugating Co.,
Wheeling, W. Va.

Sheets—Iron.
American Rolling Mill Co.,
Middletown, Ohio
Central Alloy Steel Corp.,
Massillon, Ohio

Merchant & Evans Co.,
Philadelphia, Pa.
Milwaukee Corrugating Co.,
Mil., Ch'go, La Crosse, Kan. City

Ryerson & Son, Inc., Jos. T.,
Chicago, Ill.
Taylor Co., N. & G.,
Philadelphia, Pa.

Sheets—Tin.
Merchant & Evans Co.,
Philadelphia, Pa.
Taylor Co., N. & G.,
Philadelphia, Pa.

Sheets—Zinc.
New Jersey Zinc Sales Co., The,
New York, N. Y.

Shingles and Tiles—Metal.
Milwaukee Corrugating Co.,
Mil., Ch'go, La Crosse, Kan. City

Wheeling Corrugating Co.,
Wheeling, W. Va.

Shingles—Zinc.
Milwaukee Corrugating Co.,
Mil., Ch'go, La Crosse, Kan. City

Sifters—Ash.
Diener Mfg. Co., G. W.,
Chicago, Ill.

Sky Lights.
Lupton's Sons Co., David,
Philadelphia, Pa.
Milwaukee Corrugating Co.,
Mil., Ch'go, La Crosse, Kan. City

Slops.
Peck, Stow & Wilcox Co.,
Southington, Conn.
Ryerson & Son, Inc., Jos. T.,
Chicago, Ill.

Solder.

Chicago Solder Co., Chicago, Ill.
Double-Duty Elbow Co.,
Aurora, Ill.

Milwaukee Corrugating Co.,
Mil., Ch'go, La Crosse, Kan. City

Soldering Furnaces.
Burgess Soldering Furnace Co.,
Columbus, Ohio
Clayton & Lambert Mfg. Co.,
Detroit, Mich.

Diener Mfg. Co., G. W.,
Chicago, Ill.
Double Blast Mfg. Co.,
North Chicago, Ill.

Quick Meal Stove Co.,
St. Louis, Mo.
Ryerson & Son, Inc., Jos. T.,
Chicago, Ill.

Soldering Supplies.
Double-Duty Elbow Co.,
Aurora, Ill.

Special Chemicals Co.,
Waukegan, Ill.

Specialties—Hardware.
Diener Mfg. Co., G. W.,
Chicago
Hessler Co., H. E., Syracuse, N. Y.

Stars—Hard Iron Cleaning.
Fanner Mfg. Co., Cleveland, Ohio

Statuary.
Friedley-Voshardt Co.,
Chicago, Ill.
Grock Bros. Mfg. Co.,
St. Louis, Mo.

Stove Pipe Reducers.
Milwaukee Corrugating Co.,
Mil., Ch'go, La Crosse, Kan. City

Stoves—Camp.

Quick Meal Stove Co.,
St. Louis, Mo.

Stoves—Gasoline and Oil.

Quick Meal Stove Co.,
St. Louis, Mo.

Stoves—Gasoline and Oil.

Quick Meal Stove Co.,
St. Louis, Mo.

Stoves and Ranges.

Quick Meal Stove Co.,
St. Louis, Mo.
Thatcher Co.,
Newark, N. J.

Tacks, Staples, Spikes.
American Steel & Wire Co.,
Chicago, Ill.

Timplate.
Burton Co., The W. J.,
Detroit, Mich.
Milwaukee Corrugating Co.,
Mil., Ch'go, La Crosse, Kan. City
Osborn Co., The J. M. & L. A.,
Cleveland, Ohio

Taylor Co., N. & G.,
Philadelphia, Pa.

Tools—Tinsmith's.
Bertsch & Co.,
Cambridge City, Ind.
Burton Co., The W. J.,
Detroit, Mich.

Chicago Elbow Machine Co.,
Oak Park, Ill.

Double-Duty Mfg. Co.,
Aurora, Ill.

Dries & Krump Mfg. Co.,
Chicago, Ill.

Hyro Mfg. Co.,
New York, N. Y.
Marshalltown Mfg. Co.,
Marshalltown, Iowa

Osborn Co., The J. M. & L. A.,
Cleveland, Ohio

Peck, Stow & Wilcox Co.,
Southington, Conn.
Ryerson & Son, Inc., Jos. T.,
Chicago, Ill.

Viking Shear Co.,
Erie, Pa.
Whitney Mfg. Co., W. A.,
Rockford, Ill.

Whitney Metal Tool Co.,
Rockford, Ill.

Torches.
Burgess Soldering Furnace Co.,
Columbus, Ohio
Clayton & Lambert Mfg. Co.,
Detroit, Mich.

Diener Mfg. Co., G. W.,
Chicago, Ill.

Quick Meal Stove Co.,
St. Louis, Mo.

Ryerson & Son, Inc., Jos. T.,
Chicago, Ill.

Trade Extension.
Copper & Brass Research As-
sociation, New York, N. Y.

Sheet Steel Trade Extension
Committee, Pittsburgh, Pa.

Trimmings—Stove.
Fanner Mfg. Co., Cleveland, Ohio

Ventilators.
Aeolus Dickinson Co., Chicago, Ill.
Akrat Ventilators, Inc.,
Chicago, Ill.

Arex Company, Chicago, Ill.

Berger Bros. Co.,
Philadelphia, Pa.

Friedley-Voshardt Co.,
Chicago, Ill.

Kernchen Co.,
Chicago, Ill.

Lupton's Sons Co., David,
Philadelphia, Pa.

Milwaukee Corrugating Co.,
Mil., Ch'go, La Crosse, Kan. City

Standard Ventilator Co.,
Lewisburg, Pa.

Sturtevant Co., B. F., Boston, Mass.

Ventilators—Ceiling.
Hart & Cooley Co.,
New Britain, Conn.

Henry Furnace & Fdy. Co.,
Cleveland, Ohio

Tuttle & Bailey Mfg. Co.,
New York

Sturtevant Co., B. F., Boston, Mass.

Windows—Steel.
Lupton's Sons Co., David,
Philadelphia, Pa.

Wire—Electrical.
American Steel & Wire Co.,
Chicago, Ill.

Wire Hoops.
American Steel & Wire Co.,
Chicago, Ill.

Wire Rope.
American Steel & Wire Co.,
Chicago, Ill.

Zinc.
Merchant & Evans Co.,
Philadelphia, Pa.

New Jersey Zinc Co., The,
New York, N. Y.

WANTS AND SALES

Yearly subscribers to the AMERICAN ARTISAN may insert advertisements of not more than fifty words in our Want and Sales Columns WITHOUT CHARGE.

Such advertisements, however, must be limited to help or situation wanted, tools or equipment for sale, to exchange or to buy, business for sale or location desired. This privilege is not extended to manufacturers or jobbers—or those making a business of buying and selling used machines, employment agencies and brokers.

When sending advertisement state whether your name or blind number is to be used.

BUSINESS CHANCES

Lightning Rods—Dealers who are selling Lightning Protection will make money by writing to us for our latest Factory to Dealer Prices. We employ no salesmen and save you all overhead charges. Our Pure Copper Cable and Fixtures are endorsed by the National Board of Fire Underwriters and hundreds of dealers. Write today for samples and prices. L. K. Diddle Company, Marshfield, Wisc.

Have \$3,000.00 to invest in a good plumbing and heating business. I am an Illinois licensed Master Plumber. Would like to connect with a good live wire. State full particulars and what you have to offer in first letter. Address E461, AMERICAN ARTISAN, 620 S. Michigan Avenue, Chicago, Ill.

For Sale—Established Sheet Metal and radiator repair shop in county seat town. Only shop in county. Good farming country with ideal climate and pure water. Must sell on account of illness. Investigate. Address Tin Shop, Holyoke, Colo. X460

Wanted—30 inch bar folder. State name and price. Address Y460, AMERICAN ARTISAN, 620 So. Michigan Avenue, Chicago, Ill.

SITUATION WANTED

Position Wanted—By tinner and plumber who is capable of planning, laying out and installing furnaces according to the Standard Code, laying out and installing plumbing, hot water and steam heating systems. Must be a steady job, by the year. Southern Minnesota, Iowa or Northern Illinois preferred. Address Tinner & Plumber, 235 W. Homer, Freeport, Ill. t460

Position Wanted—By a first class furnace salesman who understands the Standard Code and who has had both jobbers and retail experience. Have been a branch manager for the last 15 years for two well known firms. Can plan and install and supervise jobs of any size. Address L461, AMERICAN ARTISAN, 620 S. Michigan Avenue, Chicago, Ill.

Young man 40 years of age. Sheet metal, stove and furnace man wishes to get in line with some good concern as traveling salesman for the coming year. Address S-461, AMERICAN ARTISAN, 620 So. Michigan Ave., Chicago, Ill.

SITUATION WANTED

Situation Wanted—Salesman who has always paid dividends is open for a change for 1928 with some good stove and furnace manufacturer in central or western states territory. Will consider position only where there is a chance for advancement and increased remuneration. Address H461, AMERICAN ARTISAN, 620 S. Michigan Avenue, Chicago, Ill.

Situation Wanted—By man thoroughly familiar with sheet metal and sheet metal products. Capable of handling correspondence, purchasing and general office work. Would also consider sales position as I am well acquainted with the trade in Chicago and vicinity. Address R460, AMERICAN ARTISAN, 620 So. Michigan Avenue, Chicago.

Situation Wanted—By a number one tinner and plumber. Can handle hot water and steam heat. Have had fourteen years' experience. Nothing but year around job considered. Married and can furnish the best of references. Address S460, AMERICAN ARTISAN, 620 So. Michigan Avenue, Chicago.

Situation Wanted—First class tinner and furnace man, also pumps and wind mills, desires change first of year. 15 years' experience. Married. Only steady employment considered. Can give references. Address F-460, AMERICAN ARTISAN, 620 South Michigan Avenue, Chicago, Illinois.

Situation Wanted—First-class tinner and furnace man. Can handle inside and outside work. 25 years at the trade. Nothing but steady job the year around. Married. Can do anything that comes in a tin shop. Address W. J. Mack, R. F. D. Route 2, St. Charles, Ill., % Mary Heith.

Position Wanted—By capable foreman, sheet metal pattern draftsman and worker, also blow pipe experience, as executive or foreman. Can fill position any time. References if required. Address J461, AMERICAN ARTISAN, 620 S. Michigan Avenue, Chicago.

Situation Wanted—By a practical all-around tinner. Can work outside and inside, lay out my own work. I have been at the trade for the past 25 years. Prefer Minnesota or Wisconsin. Address K461, AMERICAN ARTISAN, 620 S. Michigan Avenue, Chicago.

Situation Wanted—First class plumber and sheet metal worker wants a position. Address Plumber, 30 East 4th Avenue, Spokane, Washington. G-460

HELP WANTED

Wanted—First class sheet metal worker and furnace man. This will be a steady job the year round for the right man. Highest wages paid. Natchez is one of the best towns in the states. Address B. Butchart, 103 South Pine Street, Natchez, Mississippi. H-460

Wanted—At once, all around man to do sheet metal and some plumbing such as comes in a country shop. Wages \$30.00 per week year around. Address O. L. Doward, Box 115, Mt. Morris, Ill. G461

Wanted—for Wisconsin and Illinois territory, salesman familiar with furnaces and stoves. Write, giving full particulars. Address D-461, AMERICAN ARTISAN, 620 So. Michigan Ave., Chicago.

TINNERS' TOOLS

For Sale—One 8-foot double truss (used) cornice brake; \$75.00 f. o. b. Fond du Lac. Will bend 16 gauge, 8 ft. long. Address Jacob Brenner, 45 3rd St., Fond du Lac, Wis. R461

Wanted—One 30 inch square shears, in good condition, with attachments. Lowest cash price. F. O. B. L. E. Aitken, 112 West 6th Street, Muscatine, Ia. F461.

SPECIAL NOTICES

The Rate for Special Notices
— displayed want ads —
\$3.00 per inch per insertion

When sending copy state whether your name or blind number is to be used—also how many insertions are desired.

PATENTS

HUBERT E. PECK
Patent Attorney

Barrister Bldg., WASHINGTON, D. C.

Services of a Sales Director, available December 15th. Samples of work, suitable credentials and evidence of success can be shown. Full experience in sales and advertising direction. Address L-460, care of American Artisan, 620 South Michigan Avenue, Chicago, Illinois.

WELL KNOWN TRADE MARK WARM AIR FURNACE

manufacturer requires three high grade heating salesmen to complete 1928 staff. Territories Michigan, Indiana, and Illinois, outside of Cook County. Substantial salary guaranteed, also commission beyond quota. Address Z460, American Artisan, 620 So. Michigan Avenue, Chicago, Ill.

PARTNER WANTED

We have a well established furnace business in an urban center of 250,000 population and need a partner to assume full management. If he has a record of having made profits in the furnace business and is willing to install according to the Standard Code or better, he can acquire full half interest without any capital as we have plenty of capital to handle a business of 600 or 700 jobs per year. Address T461, American Artisan, 620 South Michigan Avenue, Chicago, Ill.

SALES AND PRODUCTION ENGINEER

My services will be available after December 15th as office or field salesman capable of handling dealers and increasing their business. My many years' experience in warm air heating is an asset for the manufacturer as well. Address American Artisan, 620 South Michigan Avenue, Chicago, Ill. X461

Pat. Applied For

TEST ITS PULLING POWER
AND NOTICE ITS
EFFICIENCY

A Quality Product
Write for Information and Prices.

AKRAT VENTILATORS, INC.
1191 Builders Bldg. CHICAGO

SPECIAL NOTICES

WANTED
COMMISSION
SALESMEN

Owing to a large increase in capacity The Excelsior Steel Furnace Company, 118 S. Clinton St., Chicago, wishes to engage several additional commission salesmen. The Excelsior line is one of the largest and most complete made, embracing Furnaces, Furnace Pipe, Stove Pipe and Furnace accessories, all of the highest quality. Branches and distributors located in important cities enable the company to supply its products promptly to dealers in all parts of the country. The line is easy to sell as dealers prefer Excelsior goods which, though superior in every respect, are sold at competitive prices. Apply immediately as territory is to be assigned in the near future.

X459

POSITION WANTED

by a capable executive 39 years of age. He has had many years practical experience in the different branches of the stove and furnace industry, also in selling and directing of sales. Has held present position of assistant salesman for past 6 years. Address M460, American Artisan, 620 S. Michigan Ave., Chicago, Ill.

A SEASONED SALES
EXECUTIVE

with 20 years experience seeks new opportunity. Successful record. A constructive thinker, with initiative, is prepared to assume complete charge of sales and promotional work, for a manufacturer of a quality product. Clientele embraces, hardware, furnaces, plumbing and heating and sheet metal trades in the central west. Married. References, including banks, upon request. Address O460, American Artisan, 620 So. Michigan Ave., Chicago, Ill.

FURNACE FITTINGS
FOREMAN

Attractive opportunity in central west factory, making galvanized and tin furnace fittings, for capable foreman. Should be pattern draftsman, accuracy essential. Able to make fittings and to instruct help in efficient production at lowest cost. Write in confidence, giving age, present location, and occupation, experience in furnace fittings, and state when available for new opening. Address P460, American Artisan, 620 So. Michigan Ave., Chicago, Ill.

SPECIAL NOTICES

WANTED

Good Live Furnace Salesmen for Central Illinois. Address Ideal Furnace Company, Detroit, Mich. D460.

SALESMAN—

An established manufacturer of warm air furnaces (Cast Iron) seeks a salesman for Chicago and northern Illinois territory. Must be a producer accustomed to better than the average earning power. In your reply please fully cover past experience, and indicate salary expected. Address W461, American Artisan, 620 South Michigan Avenue, Chicago, Illinois.

Radiator
Repairmen's
Tools and Supplies

Write for Catalogue
F. L. Curfman Mfg. Co., Maryville, Mo.
Q461

Supposing you owned a real race horse—wouldn't you engage the very best trainer to coach this horse to win the race? Of course you would—even paying \$15,000 to \$30,000 a year as your trainer's salary.

WHY NOT APPLY THIS COACHING TO YOURSELF—TO WIN?

Your fortune can never be made by what you learned as an Apprentice—no matter what you now are. If your Trade is worth working at—it certainly is worth learning well!

COME! IDENTIFY YOURSELF WITH THE NEW SCHOOL SEASON

THE ST. LOUIS TECHNICAL INSTITUTE is qualified to Coach you in a bigger Commercial way where we can open many opportunities like these for you:

1. Read Blue Print Plans,
2. Be 100% Better Mechanic,
3. Be a High Class Foreman,
4. Be an Expert Draftsman,
5. Plant Superintendent,
6. Technical Salesman,
7. Branch Manager,
8. Successful Contractor,
9. Successful Manufacturer,
10. Corporation Manager.

Yes, Sir! we train you in your own Home, Personal, Clear, Direct.
Check your course—write today, before you forget it.

SHEET METAL DESIGN AND PATTERN DRAFTING
 SPECIAL WARM AIR FURNACE HEATING
 SHEET METAL CONTRACTING & ESTIMATING
 FAN HEATING VENTILATING ENGINEERING

THE ST. LOUIS TECHNICAL INSTITUTE G. W. KOTHE, Pres. 4543 Clayton Ave., St. Louis, Mo.

SPECIAL NOTICES

POSITION WANTED

by experienced furnace salesman with long producing record. Wishes territory in Chicago or vicinity. Able to open new accounts for a good furnace concern immediately. Address M461, American Artisan, 620 S. Michigan Ave., Chicago.

WANTED SALESMAN

to sell high class steel furnace. One with following. Salary, expenses and bonus. Several territories open. Address Colburn Heater Company, 1955 N. Long Avenue, Chicago, Ill.

O461

STAR SALESMAN

WANTED

We have a fine territory open for an exceptional salesman and we are willing to pay what a good man is worth. Do not answer unless you can show a sales record above the average as well as a thorough knowledge of the furnace business. Address Lennox Furnace Company, Inc., Syracuse, New York.

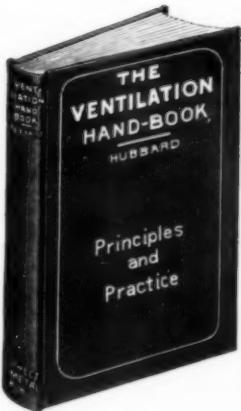
P461

WE WANT TO MEET A
SHEET METAL WORKER
OF A CERTAIN TYPE—

Somewhere in Northern Illinois or Southern Wisconsin—there is a sheet metal worker who is sick and tired of being the under-dog—and ready right now to strike out in the FURNACE business for himself. He is primarily interested in the STANDARD CODE and knows how to use it and why.

He is honest—thrifty enough to have a home and bank account—and a worker. If you think you are that man—if you are ready to step off into a business of your own—write and tell us fully and frankly about yourself.

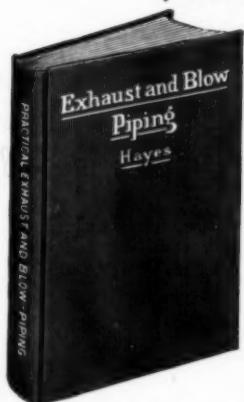
Address Y461, care American Artisan, 620 South Michigan Avenue.


 Order your **Christmas Books Now**


THE VENTILATION HANDBOOK A PRACTICAL book designed to cover the principles and practice of ventilation as applied to furnace heating; ducts, flues and dampers for gravity heating; fans and fan work for ventilation and hot blast heating by means of a comprehensive series of questions, answers and very plain descriptions easy to understand. By Charles L. Hubbard. Price \$2.00

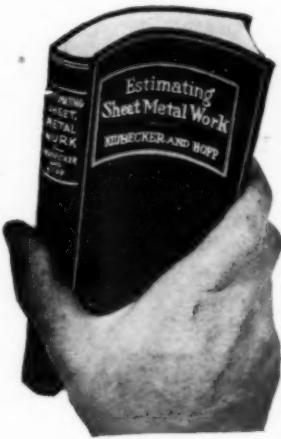
HAYES PRACTICAL EXHAUST AND BLOW PIPING

EXHAUST and Blow Piping has had an unusually big demand. A fresh supply is now off the press and is in our hands for immediate delivery. It has an invaluable treatise on the planning, cost, estimation and installation of fan piping in all its branches, giving all necessary guidance in fan work blower and separator construction. 159 pages, 5 x 8, 51 figures. By Hayes. Cloth \$2.00



ESTIMATING SHEET METAL WORK

ANOTHER good book by Wm. Neubeker and A. Hopp. This is a new edition. A manual of practical self-instruction in the art of pattern drafting and construction work in light and heavy gauge metal, including skylights and roofing, cornice work, etc. 417 pages; 4 1/2 x 7 in.; 215 figures. Cloth. Price



\$3.00

Every Sheet Metal worker should own this 2 Volume Encyclopedia of Sheet Metal Working

THE most practical and useful treatises on the subject.

Work of all the branches of the trade and the broadest scope of details are found—inside and outside work—small jobs and the most complicated are shown, explained and profusely illustrated.

The first volume deals with all types and kinds of inside small and large sheet metal work.

The second volume deals with the more advanced branches of sheet metal work, in fact is largely devoted to the architectural end of the business. It consists of 400 double column pages and is illustrated with 711 engravings showing all methods under treatment, as well as perspective views of the subjects of the patterns, and other demonstrations in their finished state. It includes drawing, full sized detailing and lettering, development and construction of all forms of sheet metal construction work.

The volumes are bound in heavy cloth and each measures 9x12 in. Each contains over 380 pages and 680 original drawings. Price each

\$7.50

\$3.00



THE NEW METAL WORK PATTERN BOOK IT contains solutions of individual pattern problems in every department of sheet metal work, giving the complete methods of laying out all forms of work. It covers every detail from the selection of tools, through Linear and Geometrical Drawing, to development of Difficult Problems by Triangulation. This revised edition contains a series of automobile patterns. These include laying out guards, fenders, cowls, skirts, hoods, etc. It has 514 pages, 895 illustrations and diagrams, measures 9x12 inches and is cloth bound. Price \$6.00

THE NEW TINSMITH'S HELPER AND PATTERN BOOK

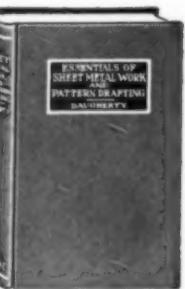
A NEW edition of one of the most popular books on tin-smithing and elementary sheet metal work. The contents of this new edition are new excepting the chapter on Mensuration, which has been re-arranged and amplified, and possibly some fifty pages of problems and tables which are classified to the phase of the work they

cover. This book covers simple geometry and every phase of modern pattern cutting, from the making of every type of Seam, Lap and Joint, to Conical Problems and Tinware, Elbows, Piping, Ducts, Gutters, Leaders, Cornice and Skylight Work and Furnace Fittings. 352 pages, 247 figures and 165 tables, flexible leather bound and measures 4 1/2 x 5 inches. By Hall V. Williams. Price

\$3.00

ESSENTIALS OF SHEET METAL WORK AND PATTERN DRAFTING

A BOOK produced by the combined efforts of L. Broemel and the late Professor J. S. Daugherty, Instructor in Sheet Metal Work at the Carnegie Institute of Technology. Pattern drafting is its biggest feature; not only tells how to make the pattern, but how to develop it with modern machines and tools; gives valuable assistance on soldering, brazing, welding, crimping, heading, straight, circular and irregular cutting. Bound in leatherette; 500 pages; more than 400 pen drawings and illustrations. Price \$2.00



Books Wanted

AMERICAN ARTISAN, 620 S. Michigan Ave. Chicago, Ill.

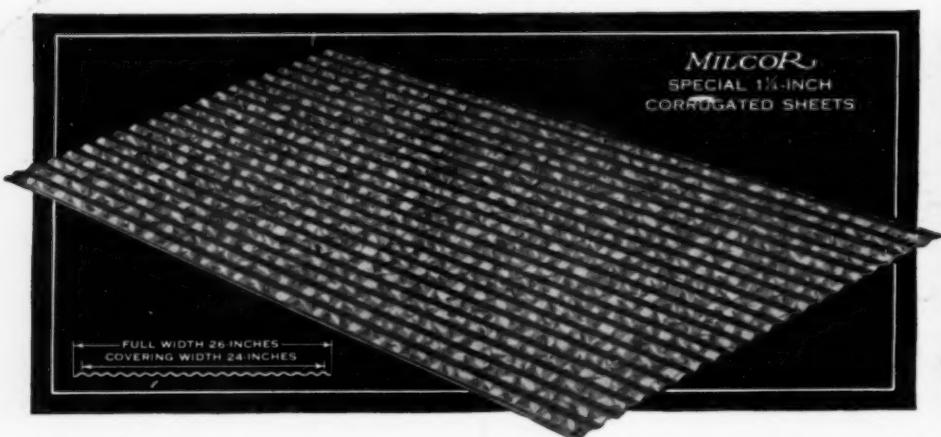
For the enclosed \$ send the books ordered and enter following subscription (or renewal.)

Name

Address

NOTE

Deduct 10% from TOTAL amount of order when subscription is included with order for books.



What you want—and when!

YOU will find it in the Milcor Net Price Book. Carry it on your hip. Thousands of sheet metal men do. It's a business-like habit. For Milcor has *what you want...ready when you want it!*

Your Trade appreciates Milcor quality and service, too! Same-day deliveries direct from our Milwaukee, Chicago, Kansas City or La Crosse plants....or from leading jobbers.

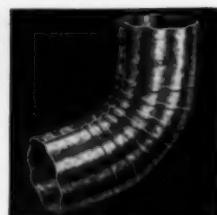
For over 20 years, these famous "Kuehn's Korrek Kutoffs" (Pat'd.) have been made by Milcor. And they are still the best cutoffs made.



The famous Milcor "Crimpedge Gutter" — the most popular single-bead eaves trough ever made. Millions of feet of it in service. Standardize on it.



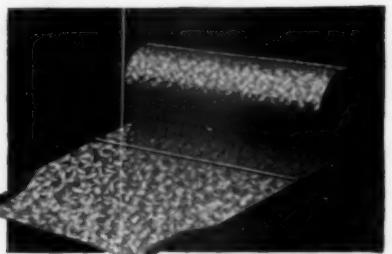
Style box-gutters, conductor pipe, heads and bands, architectural sheet metal, marques, metal ceilings, ventilators, skylights, metal lath and allied products are included in the complete Milcor Line.



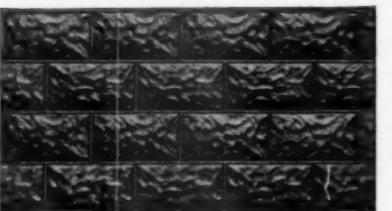
Milcor One-piece flat-crimp conductor pipe Elbows, round or square, are designed to withstand severe service. Dependable, uniform quality.



Milcor Galv. or Painted Pressed Standing Seam Roofing. Three styles: Regular, Beaded, and Noiseless.



Milcor Roll Roofing, Black or Galv. Flat Sheets, Terne Plates, Stove Pipe Iron, Sheet Copper, Sheet Zinc — always in stock, for immediate shipment.



Milcor "Rock Face Stone" Metal Siding, Galv. or Painted.



Milcor "Weatherboard" Metal Siding, Galv. or Painted. See Page 77 in Net Price Book.

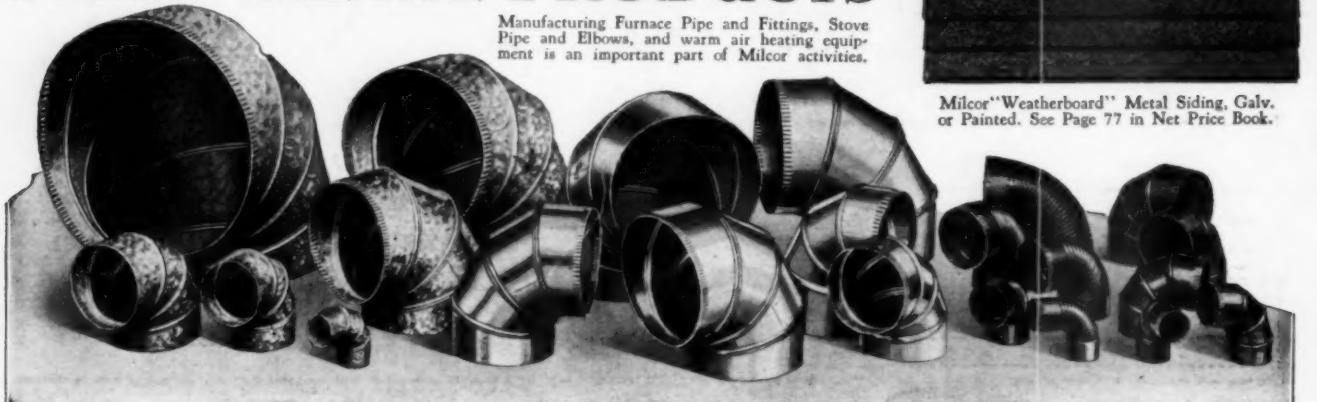
Milcor products are now made not only in Steel, but also in "Coppered Metal", Wilder Metal, pure Zinc, pure ANACONDA Copper, or in the famous rust-resisting ARMCO Ingot Iron. Look for this mark:

MILWAUKEE CORRUGATING COMPANY
MILWAUKEE, WIS. CHICAGO, ILL. KANSAS CITY, MO. LA CROSSE, WIS.

MILCOR

SHEET METAL PRODUCTS

Manufacturing Furnace Pipe and Fittings, Stove Pipe and Elbows, and warm air heating equipment is an important part of Milcor activities.



15
Sh